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Results for the Atlantic cod, roughhead grenadier, redfish, thorny skate and black dogfish of the Spanish Survey in the NAFO Div. 3L for the period 2003-2007

by

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Abstract

Since 2003, a stratified random spring bottom trawl survey in the NAFO Regulatory Area of Division 3L (Flemish Pass) was conducted by Spain. The surveys were carried out by the R/V *"Vizconde de Eza"* using bottom trawl net type *Campelen*. Entire series of mean catches, biomass and length distribution for Atlantic cod, roughhead grenadier, redfish, thorny skate and black dogfish are presented for the period 2003-2007.

KEYWORDS: Survey, Flemish Pass, Atlantic Cod, Roughhead grenadier, Redfish, Thorny skate, Black dogfish.

Material and Methods

The surveys on NAFO Regulatory Area of Div. 3L (Flemish Pass) were initiated by Spain in 2003. The Research vessel *"Vizconde de Eza"* carried out the surveys following the same procedures and using the same bottom trawl gear *Campelen*. In 2003, the survey was carried out in spring (June) and it did not cover all strata adequately (69% of the total area prospected in 2006-2007). In 2004, the survey was carried out in August, for a period of nine days, and it covered only the 96%. In 2005, it was not possible to perform the survey due to problems with the winch of the ship; and in 2006, for the first time, an adequate prospecting survey was conducted in Division 3L with over 100 valid hauls. Table 1 shows the number of valid tows, the depth and number of covered strata and the dates of the survey series. To know more details about the technical specifications of the surveys, see Román *et al*., 2008.

The catch from each haul was sorted out and weighted by species and a sample of each species was taken in order to measure it and obtain the length distribution. In 2003 and 2004 the Atlantic cod samples were not sorted out by sex. There are two species of redfish in Division 3L (*Sebastes mentella* and *S. fasciatus*); the external characteristics of both species are very similar, which makes it difficult to distinguish between them and, as a result, they are treated together.

For Atlantic cod, redfish, thorny skate and black dogfish each individual of the sample was measured to the total length to the nearest lower cm and data are given in 2 cm intervals. However, roughhead grenadier individuals were measured from tip of snout to base of first anal-fin ray to the lower ½ cm., in 0.5 cm intervals, as adopted by NAFO in June 1980 (Atkinson, 1991) as a standard measurement for roundnose and roughhead grenadiers; length is presented as pre-anal-fin length (AFL) and data are given in 1 cm intervals.

We present the mean catch per haul, the stratified mean catch per haul and the biomass with their variance per year in the period 2003-2007. Length distribution in number per haul stratified mean catches per length, sex and year for these species are presented too. To obtain the biomass from length distribution, the following formula was used: $Weight=a(Length+0.5)^b$.

Results

Atlantic Cod (*Gadus morhua* Linnaeus, 1758)

NAFO manages 3 cod stocks in 3L, 3M and 3NO and a moratorium is in place for all 3 stocks. Cod had a dramatic decline during the eighties and nineties and fishing bans were imposed in the 1990s. All stocks remain at a very low level (NAFO, 2007).

Mean catches and biomass

Table 2 shows the swept area, the tow number, the mean catches and their variance per haul and year for Atlantic cod. Table 3 and Figure 1 present the stratified mean catches per stratum with the total variance per year. Table 4 and Figure 2 present the biomass per swept area per stratum and their total variance per year. Table 5 presents the length-weight relationships.

Atlantic cod indices show no clear trend along the whole period. Stratified mean catch and biomass decreased from 2003 to 2004; then, the values of these indices increased in 2006 and declined briefly again in 2007. The highest values in the estimated biomass have been observed in the shallow strata, in a range of depth from 185 to 366 meters.

Length distribution

Table 6 presents the stratified mean catches per haul length distribution for this species, by sex and year, with the number of samples in which there were length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met, as well as the total catch of this species and the total hauls made in the survey. In Figures 3 and 4 the evolution along the years can be followed.

In this period, individuals between 12 and 25 cm can be seen in 2003, 2006 and 2007. In 2004 there is no presence of individuals below 24 cm.

Roughhead grenadier (*Macrourus berglax* Lacépède, 1802)

Roughhead grenadier is not a regulated species. There is no directed fishery for this species and most catches are taken as by-catch in Greenland halibut fishery in Subareas 2 and 3. Roughhead grenadier is taken mainly in Div. 3LMN Regulatory Area. The highest level of observed catches was reached in 1998. The catches decreased in 2004, and further in 2005 and 2006 (NAFO, 2007).

Mean catches and biomass

Roughhead grenadier haul mean catches by stratum are presented in Table 7; swept area, number of hauls and SD are shown in this table too. Stratified mean catches per tow by stratum and year and their variance are presented in Table 8. The entire time series (2003-2007) of biomass and their SD estimates of American plaice are shown in Table 9 and length-weight relationships are shown in Table 5.

Roughhead grenadier indices remain stable with a slight decrease in the last year. Biomass presents the same trend as mean catches since the year 2004 (Fig. 5 and 6).

Length distribution

Table 10 presents the stratified mean catches per haul length distribution, for roughhead grenadier, by sex and year, with the number of samples in which there was length measures, the total number of individuals measured in these

samples, the sampled catch and the range of lengths met. The total catch of this species and the total hauls made in the survey are shown too. In Figures 7 and 8 the evolution along the years can be followed.

In the period 2003-2007 it can be seen a slight recruitment. Females attain larger lengths than males in all years.

Redfish (*Sebastes spp*. Cuvier, 1829)

There are two species of redfish, *Sebastes mentella* (deepwater redfish) and *Sebastes fasciatus* (Acadian redfish), which occur in Div. 3LN and are managed together. These are very similar in appearance and are reported collectively. Catches are reported by genus only (*Sebastes spp*.). There is a moratorium on 3LN stocks (no directed fishery) since 1998.

The stock biomass, female spawning biomass and abundance is higher in 2006 than in the early 1990s (NAFO, 2007).

Mean catches and biomass

Table 11 shows the swept area, the tow number, the mean catches and their variance per haul and year for redfish. Table 12 and Figure 9 present the stratified mean catches per stratum with the total variance per year.

Table 13 and Figure 10 show the biomass estimate per swept area per stratum and their total variance by year. Redfish shows a great annual variability probably due to its pelagic habitat. Biomass indices decreased in 2004 and 2007. The length-weight relationships are presented in Table 5.

Length distribution

Table 14 presents the stratified mean catches per haul length distribution, for redfish, by sex and year, with the number of samples in which there was length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met. The total catch of this species and the total hauls made in the survey are shown too. In Figures 11 and 12 the evolution along the years can be followed.

The highest proportion of small redfish in the catches (less than 20 cm) was in 2007.

Thorny skate (*Amblyraja radiata* Donovan, 1808)

NAFO started to regulate skates, under a 3-year plan, in 2004. The biomass has remained relatively constant since the mid-1990s to 2005. Since then the catches have declined (NAFO, 2007).

Mean catches and biomass

Table 15 shows the swept area, the tow number, the mean catches and their variance per haul and year for thorny skate. Table 16 presents the length-weight relationships. Table 17 and Figure 13 present the stratified mean catches per stratum with the total variance per year. Table 18 and Figure 14 present the biomass per swept area per stratum and their total variance per year. The biomass indices have increased since 2004, in the prospected area, along the whole period. The biomass presents the same trend as mean catches.

Length distribution

Table 19 presents the stratified mean catches per haul length distribution for this specie, by sex and year, with the number of samples in which there was length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met, as the total catch of this species and the total hauls made in the survey. In Figures 15 and 16 we can follow the evolution along the years.

The highest proportion of small thorny skate in the catches was in 2007.

Black dogfish (*Centroscyllium fabricii* Reinhardt, 1825)

Black dogfish is present in all Divisions, but is more abundant in Div. 3NO and in depths of more than 900 m. Black dogfish is not a regulated species and commercial catches of this species are mainly a by-catch of the Greenland halibut fishery in Div. 3LMNO (González-Costas *et al*., 2006).

Mean catches and biomass

Black dogfish haul mean catches by stratum are presented in Table 20, including swept area, number of hauls and SD. Stratified mean catches per tow by stratum and year and their variance are presented in Table 21. The entire time series (2003-2007) of biomass and their SD estimates of American plaice are shown in Table 22. Length-weight relationships are presented in Table 16.

The biomass presents the same trend as mean catches. Biomass estimated from the 3L survey displays an increasing trend over the last three years (Fig. 17 and 18). In 2003, the catches occurred only in two strata (745 and 749), in which the catches were much different, that is why the variance in this year is so large.

Length distribution

Table 23 presents the stratified mean catches per haul length distribution, for black dogfish, by sex and year, with the number of samples in which there was length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met. The total catch of this species and the total hauls made in the survey are shown too. In Figures 19 and 20 the evolution along the years can be followed.

There is no presence of small individual (less than 40 cm). Size compositions are mainly between 50 and 80 cm of length.

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TABLE 1.- Spanish bottom trawl surveys in NAFO Division 3L for the period 2003-2007.

Year	Vessel	Valid tows	Depth strata covered (m)	Surveyed strata (no.)	Dates
2003	R/V *"Vizconde de Eza"*	39	118-1100	17	June 2 - June 6, June 29
2004	R/V *"Vizconde de Eza"*	50	141-1452	23	August 7 - August 15
2005	-	-	-	-	-
2006	R/V *"Vizconde de Eza"*	100	116-1449	24	July 31 - August 18
2007	R/V *"Vizconde de Eza"*	94	119-1449	24	July 23 - August 11

TABLE 2.- Swept area, number of hauls and **Atlantic cod** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2007, on board the R/V *"Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	2003 (*)				2004				2006				2007			
Stratum	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0225	2	0.062	0.040	0.0229	2	0.450	0.636	0.0229	2	1.783	2.521	0.0225	2	0.835	1.181
387	0.0229	2	4.390	1.004	0.0214	2	1.885	1.888	0.0225	2	0.395	0.559	0.0225	2	1.992	1.105
388	0.0334	3	7.870	6.987	0.0105	1	1.313	-	0.0566	5	7.028	5.142	0.0563	5	7.434	7.400
389	0.0454	4	0.844	1.573	0.0225	2	0.510	0.721	0.0795	7	10.582	14.986	0.0900	8	4.162	4.621
390	0.0563	5	0.000	0.000	0.0345	3	0.000	0.000	0.1249	11	0.081	0.249	0.1350	12	1.369	1.251
391	0.0338	3	0.167	0.289	0.0218	2	0.000	0.000	0.0450	4	14.338	13.278	0.0450	4	11.183	15.378
392	0.0116	1	0.400	-	0.0214	2	13.219	17.991	0.0229	2	2.045	1.506	0.0225	2	13.985	7.779
729	0.0210	2	1.260	1.782	0.0221	2	0.000	0.000	0.0338	3	0.000	0.000	0.0338	3	0.000	0.000
730	0.0221	2	0.000	0.000	0.0221	2	0.000	0.000	0.0326	3	0.000	0.000	0.0225	2	0.000	0.000
731	0.0229	2	22.405	13.329	0.0233	2	0.496	0.530	0.0341	3	0.000	0.000	0.0338	3	0.510	0.883
732	0.0113	1	0.000	-	0.0210	2	0.000	0.000	0.0334	3	0.000	0.000	0.0338	3	0.000	0.000
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	0.000	0.000	0.0454	4	0.000	0.000	0.0338	3	0.427	0.739
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
741	0.0113	1	0.000	-	0.0323	3	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0.000	-	0.0120	1	0.000	-	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.000	0.000	0.0218	2	0.000	0.000
745	0.0341	3	0.000	0.000	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.000	0.000
746	0.0446	4	0.000	0.000	0.0338	3	0.000	0.000	0.0675	6	0.000	0.000	0.0664	6	0.000	0.000
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.000	0.000	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000
748	0.0109	1	0.000	-	0.0199	2	0.000	0.000	0.0326	3	0.000	0.000	0.0338	3	0.000	0.000
749	0.0221	2	0.000	0.000	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	0.000	0.000	0.1005	9	0.000	0.000	0.0679	6	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s	n.s	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 3.- Stratified mean catches (Kg) and SD of **Atlantic cod** by stratum and year (2003-2007). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	7.26	53.10	-	210.34	98.53
387	1123.84	482.56	-	101.12	509.82
388	2809.59	468.74	-	2509.00	2653.87
389	429.34	259.59	-	5386.31	2118.59
390	0.00	0.00	-	65.94	1115.80
391	47.00	0.00	-	4043.18	3153.47
392	58.00	1916.68	-	296.53	2027.75
729	234.36	0.00	-	0.00	0.00
730	0.00	0.00	-	0.00	0.00
731	4839.48	107.03	-	0.00	110.16
732	0.00	0.00	-	0.00	0.00
733	n.s	0.00	-	0.00	99.84
734	n.s	0.00	-	0.00	0.00
741	0.00	0.00	-	0.00	0.00
742	0.00	0.00	-	0.00	0.00
743	n.s	0.00	-	0.00	0.00
744	n.s	0.00	-	0.00	0.00
745	0.00	0.00	-	0.00	0.00
746	0.00	0.00	-	0.00	0.00
747	n.s	0.00	-	0.00	0.00
748	0.00	0.00	-	0.00	0.00
749	0.00	0.00	-	0.00	0.00
750	n.s	0.00	-	0.00	0.00
751	n.s	n.s	-	0.00	0.00
TOTAL	9548.87	3287.70	-	12612.40	11887.83
$(\bar{y})$	2.13	0.53	-	1.94	1.83
SD	0.57	0.30	-	0.55	0.42

TABLE 4.- Survey estimates (by the swept area method) of **Atlantic cod** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V *"Vizconde de Eza"*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	1	5	-	18	9
387	98	45	-	9	45
388	253	45	-	222	236
389	38	23	-	474	188
390	0	0	-	6	99
391	4	0	-	359	280
392	5	179	-	26	180
729	22	0	-	0	0
730	0	0	-	0	0
731	423	9	-	0	10
732	0	0	-	0	0
733	n.s	0	-	0	9
734	n.s	0	-	0	0
741	0	0	-	0	0
742	0	0	-	0	0
743	n.s	0	-	0	0
744	n.s	0	-	0	0
745	0	0	-	0	0
746	0	0	-	0	0
747	n.s	0	-	0	0
748	0	0	-	0	0
749	0	0	-	0	0
750	n.s	0	-	0	0
751	n.s	n.s	-	0	0
TOTAL	844	306	-	1114	1057
SD	222	180	-	315	245

Table 5.- Length-weight relationships in the calculation of biomass, for Division 3L (out ZEE Canada), 2003-2007 for Atlantic cod, roughhead grenadier and redfish. The equation is $Weight=a(Length+0.5)^b$. To calculate the parameters for the indeterminate individuals, we used the total data (males+females+indeterminate individuals).

Year	Sex	Length-Weight Equations	N	r^2
Atlantic cod				
2003	All	$W = 0.0059\ L^{3.0965}$	161	0.9875
	Males	-	-	-
	Females	-	-	-
2004	All	$W = 0.0045\ L^{3.2037}$	58	0.9805
	Males	-	-	-
	Females	-	-	-
2006	All	$W = 0.0057\ L^{3.3142}$	308	0.9854
	Males	$W = 0.0043\ L^{3.2188}$	142	0.9808
	Females	$W = 0.0069\ L^{3.0874}$	166	0.9896
2007	All	$W = 0.0055\ L^{3.1370}$	225	0.9830
	Males	$W = 0.0061\ L^{3.1114}$	107	0.9910
	Females	$W = 0.0047\ L^{3.1750}$	118	0.9735
Roughhead grenadier				
2003	All	$W = 0.0766\ L^{3.0029}$	478	0.9872
	Males	$W = 0.0482\ L^{3.1908}$	172	0.9772
	Females	$W = 0.0824\ L^{2.9761}$	290	0.9913
2004	All	$W = 0.0791\ L^{3.0113}$	1066	0.9896
	Males	$W = 0.0085\ L^{2.9868}$	458	0.9866
	Females	$W = 0.0788\ L^{3.0119}$	597	0.9906
2006	All	$W = 0.0773\ L^{3.0264}$	1645	0.9817
	Males	$W = 0.0664\ L^{3.0810}$	655	0.9748
	Females	$W = 0.0893\ L^{2.9794}$	975	0.9860
2007	All	$W = 0.0885\ L^{2.9691}$	1950	0.9895
	Males	$W = 0.0946\ L^{2.9435}$	754	0.9859
	Females	$W = 0.0877\ L^{2.9727}$	1165	0.9897
Redfish				
2003	All	$W = 0.0037\ L^{3.3842}$	238	0.9902
	Males	$W = 0.0103\ L^{3.0686}$	95	0.9787
	Females	$W = 0.0060\ L^{3.2380}$	90	0.9930
2004	All	$W = 0.0083\ L^{3.1377}$	237	0.9808
	Males	$W = 0.0161\ L^{2.9333}$	97	0.9877
	Females	$W = 0.0190\ L^{2.8927}$	117	0.9881
2006	All	$W = 0.0096\ L^{3.1034}$	920	0.9835
	Males	$W = 0.0100\ L^{3.0871}$	444	0.9843
	Females	$W = 0.0091\ L^{3.1221}$	471	0.9811
2007	All	$W = 0.0080\ L^{3.1588}$	881	0.9842
	Males	$W = 0.0140\ L^{2.9836}$	432	0.9858
	Females	$W = 0.0133\ L^{3.0115}$	392	0.9868

TABLE 6.- Atlantic cod length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey in NAFO 3L: 2003-2007 (R/V *"Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	2003 (*)				2004				2006				2007			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
12	0.000	0.000	0.029	0.029	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000	0.011	0.000	0.011
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011
16	0.000	0.000	0.095	0.095	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.021	0.000	0.000	0.021
18	0.000	0.000	0.060	0.060	0.000	0.000	0.000	0.000	0.000	0.033	0.000	0.033	0.040	0.029	0.000	0.070
20	0.000	0.000	0.095	0.095	0.000	0.000	0.000	0.000	0.033	0.000	0.000	0.033	0.042	0.000	0.000	0.042
22	0.000	0.000	0.182	0.182	0.000	0.000	0.000	0.000	0.055	0.022	0.000	0.076	0.022	0.011	0.000	0.032
24	0.000	0.000	0.339	0.339	0.000	0.000	0.016	0.016	0.077	0.099	0.000	0.176	0.011	0.010	0.000	0.021
26	0.000	0.000	0.380	0.380	0.000	0.000	0.033	0.033	0.088	0.165	0.000	0.252	0.011	0.000	0.000	0.011
28	0.000	0.000	0.242	0.242	0.000	0.000	0.058	0.058	0.087	0.186	0.000	0.273	0.020	0.040	0.000	0.060
30	0.000	0.000	0.303	0.303	0.000	0.000	0.152	0.152	0.131	0.186	0.000	0.317	0.049	0.020	0.000	0.069
32	0.000	0.000	0.271	0.271	0.000	0.000	0.033	0.033	0.196	0.109	0.000	0.305	0.051	0.065	0.000	0.116
34	0.000	0.000	0.283	0.283	0.000	0.000	0.047	0.047	0.152	0.098	0.000	0.250	0.074	0.064	0.000	0.138
36	0.000	0.000	0.372	0.372	0.000	0.000	0.085	0.085	0.120	0.109	0.000	0.229	0.072	0.134	0.000	0.206
38	0.000	0.000	0.350	0.350	0.000	0.000	0.147	0.147	0.109	0.119	0.000	0.229	0.137	0.171	0.000	0.308
40	0.000	0.000	0.196	0.196	0.000	0.000	0.102	0.102	0.054	0.118	0.000	0.172	0.107	0.139	0.000	0.245
42	0.000	0.000	0.382	0.382	0.000	0.000	0.098	0.098	0.117	0.065	0.000	0.182	0.103	0.139	0.000	0.243
44	0.000	0.000	0.096	0.096	0.000	0.000	0.056	0.056	0.131	0.097	0.000	0.228	0.106	0.074	0.000	0.179
46	0.000	0.000	0.124	0.124	0.000	0.000	0.035	0.035	0.108	0.131	0.000	0.239	0.020	0.134	0.000	0.155
48	0.000	0.000	0.128	0.128	0.000	0.000	0.012	0.012	0.033	0.087	0.000	0.120	0.073	0.042	0.000	0.115
50	0.000	0.000	0.077	0.077	0.000	0.000	0.035	0.035	0.032	0.052	0.000	0.084	0.020	0.030	0.000	0.051
52	0.000	0.000	0.117	0.117	0.000	0.000	0.000	0.000	0.022	0.054	0.000	0.076	0.021	0.052	0.000	0.073
54	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.012	0.000	0.041	0.000	0.041	0.050	0.021	0.000	0.071
56	0.000	0.000	0.027	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.041	0.000	0.060
58	0.000	0.000	0.024	0.024	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.032	0.030	0.000	0.062
60	0.000	0.000	0.024	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.011	0.000	0.020
62	0.000	0.000	0.027	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.022
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.000
66	0.000	0.000	0.024	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
68	0.000	0.000	0.024	0.024	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.010	0.000	0.010
70	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
72	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
76	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011
78	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.000	0.000	0.000
80	0.000	0.000	0.027	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.000	0.000	4.300	4.300	0.000	0.000	0.920	0.920	1.566	1.816	0.000	3.382	1.132	1.300	0.000	2.432
Nº samples:																
Nº Ind.:				14				9				22				32
Sampled catch:	-	-	160	160	-	-	55	55	143	167	0	310	107	119	0	226
Range:				84				34				176				168
Total catch:				13-81				24-55				13-79				12-76
Total hauls:				84				34				176				168

TABLE 7.- Swept area, number of hauls and **roughhead grenadier** mean catch (Kg) and SD (**) by stratum. Spanish Survey in NAFO Div. 3L for the period 2003-2007, on board the R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
387	0.0229	2	0.000	0.000	0.0214	2	59.987	23.598	0.0225	2	34.790	20.520	0.0225	2	45.990	51.746
388	0.0334	3	0.000	0.000	0.0105	1	43.300		0.0566	5	26.406	7.803	0.0563	5	37.663	22.136
389	0.0454	4	0.000	0.000	0.0225	2	1.875	2.652	0.0795	7	1.426	2.642	0.0900	8	3.075	8.697
390	0.0563	5	0.560	1.252	0.0345	3	0.007	0.012	0.1249	11	0.000	0.000	0.1350	12	0.000	0.000
391	0.0338	3	0.017	0.029	0.0218	2	0.018	0.025	0.0450	4	178.123	304.579	0.0450	4	86.525	171.255
392	0.0116	1	3.900	-	0.0214	2	200.650	255.195	0.0229	2	118.025	159.347	0.0225	2	129.950	138.805
729	0.0210	2	37.750	4.596	0.0221	2	29.475	17.501	0.0338	3	25.164	23.944	0.0338	3	26.490	13.222
730	0.0221	2	101.050	37.972	0.0221	2	33.715	0.544	0.0326	3	53.270	7.021	0.0225	2	81.378	33.061
731	0.0229	2	3.510	1.824	0.0233	2	10.450	5.162	0.0341	3	10.512	3.252	0.0338	3	14.333	7.365
732	0.0113	1	34.400	-	0.0210	2	39.490	7.594	0.0334	3	22.164	9.200	0.0338	3	11.151	3.253
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	15.553	5.137	0.0454	4	23.450	16.806	0.0338	3	19.104	14.162
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	65.850	106.305	0.0225	2	39.315	9.638	0.0225	2	23.400	8.202
741	0.0113	1	8.7	-	0.0323	3	1.055	1.342	0.0218	2	17.557	23.112	0.0225	2	4.650	6.166
742	0.0116	1	24.4	-	0.0120	1	4.700	-	0.0229	2	20.933	7.015	0.0225	2	14.493	2.011
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	26.245	6.017	0.0225	2	10.574	6.353	0.0225	2	29.666	25.928
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	2.550	-	0.0229	2	15.365	15.111	0.0218	2	33.965	0.375
745	0.0341	3	17.546	10.764	0.0319	3	5.800	2.722	0.0686	6	8.238	5.438	0.0675	6	3.624	1.509
746	0.0446	4	63.8	71.784	0.0338	3	26.205	21.151	0.0675	6	41.767	29.972	0.0664	6	34.607	22.333
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	43.627	13.999	0.1230	11	42.307	40.112	0.1238	11	62.510	26.732
748	0.0109	1	55.98	-	0.0199	2	22.515	18.547	0.0326	3	67.920	73.796	0.0338	3	33.533	16.455
749	0.0221	2	145.2	23.193	0.0221	2	45.900	51.336	0.0229	2	25.930	31.919	0.0113	1	28.700	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	56.750	36.416	0.1005	9	16.866	18.117	0.0679	6	19.516	24.114
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	4.253	3.543	0.0225	2	24.445	7.983

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 8.- Stratified mean catches (Kg) and SD of **roughhead grenadier** year (2003-2007). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0.00	0.00	-	0.00	0.00
387	0.00	15356.54	-	8906.24	11773.44
388	0.00	15458.10	-	9426.94	13445.76
389	0.00	954.38	-	725.69	1565.18
390	456.40	5.43	-	0.00	0.00
391	4.70	4.94	-	50230.55	24400.05
392	565.50	29094.25	-	17113.63	18842.75
729	7021.50	5482.35	-	4680.44	4927.20
730	17178.50	5731.55	-	9055.90	13834.26
731	758.16	2257.20	-	2270.52	3095.93
732	7946.40	9122.19	-	5119.88	2575.96
733	n.s	3639.48	-	5487.30	4470.26
734	n.s	10075.05	-	6015.20	3580.20
741	870.00	105.53	-	1755.70	465.00
742	1561.60	300.80	-	1339.68	927.55
743	n.s	1338.50	-	539.27	1512.97
744	n.s	168.30	-	1014.09	2241.69
745	6106.24	2018.40	-	2866.88	1261.09
746	25009.60	10272.36	-	16372.53	13565.94
747	n.s	31585.71	-	30630.47	45257.17
748	8900.82	3579.89	-	10799.28	5331.80
749	18295.20	5783.40	-	3267.18	3616.20
750	n.s	31553.00	-	9377.25	10850.99
751	n.s	n.s	-	973.82	5597.91
TOTAL	94674.62	183887.34	-	197968.44	193139.30
$(\bar{y})$	21.16	29.38	-	30.52	29.77
SD	3.38	5.27		7.41	4.86

TABLE 9.- Survey estimates (by the swept area method) of **roughhead grenadier** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V *"Vizconde de Eza"*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0	0	-	0	0
387	0	1437	-	792	1047
388	0	1472	-	832	1195
389	0	85	-	64	139
390	41	0	-	0	0
391	0	0	-	4465	2169
392	49	2722	-	1496	1675
729	669	496	-	416	438
730	1553	518	-	833	1230
731	66	194	-	200	275
732	706	869	-	460	229
733	n.s	331	-	484	397
734	n.s	995	-	535	318
741	77	10	-	161	41
742	134	25	-	117	82
743	n.s	143	-	48	134
744	n.s	17	-	89	206
745	537	190	-	251	112
746	2242	913	-	1455	1226
747	n.s	3082	-	2739	4023
748	818	360	-	993	474
749	1654	523	-	286	321
750	n.s	3506	-	840	959
751	n.s	n.s	-	86	498
TOTAL	8546	17887	-	17641	17190
SD	1340	3240	-	4271	2799

TABLE 10.- Roughhead grenadier length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey in NAFO 3L: 2003-2007 (R/V *"Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	2003 (*)				2004				2006				2007			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
1.5	0.000	0.000	0.025	0.025	0.000	0.000	0.024	0.024	0.000	0.000	0.040	0.040	0.000	0.020	0.010	0.030
2.5	0.371	0.161	0.670	1.201	0.018	0.019	0.060	0.097	0.070	0.040	0.024	0.134	0.000	0.041	0.148	0.188
3.5	0.175	0.107	0.197	0.478	0.767	0.207	0.179	1.153	0.612	0.156	0.141	0.910	0.398	0.168	0.696	1.262
4.5	0.183	0.203	0.000	0.386	0.088	0.073	0.000	0.162	0.145	0.000	0.000	0.145	0.082	0.062	0.020	0.164
5.5	1.679	1.701	0.000	3.380	0.356	0.416	0.000	0.772	0.124	0.151	0.000	0.274	0.341	0.209	0.018	0.569
6.5	0.941	0.881	0.000	1.822	0.724	1.077	0.000	1.801	0.912	0.713	0.000	1.625	0.939	0.754	0.000	1.693
7.5	0.545	0.339	0.000	0.884	0.320	0.393	0.000	0.713	0.619	0.477	0.000	1.096	0.282	0.329	0.000	0.612
8.5	0.598	0.857	0.000	1.455	0.802	0.923	0.000	1.725	0.461	0.504	0.000	0.965	0.538	0.683	0.012	1.233
9.5	0.530	0.683	0.000	1.213	1.053	1.117	0.000	2.170	0.954	0.866	0.000	1.820	0.604	0.812	0.000	1.416
10.5	1.171	1.102	0.000	2.273	0.870	0.550	0.000	1.421	0.868	0.977	0.000	1.845	0.837	0.549	0.000	1.386
11.5	0.899	0.943	0.000	1.841	1.032	1.129	0.000	2.161	1.361	1.258	0.000	2.620	1.208	1.116	0.000	2.324
12.5	1.481	0.844	0.000	2.325	1.467	1.273	0.000	2.740	1.826	1.776	0.005	3.607	1.126	1.222	0.000	2.348
13.5	1.869	1.396	0.000	3.265	1.640	1.047	0.000	2.687	1.661	1.746	0.005	3.412	1.463	1.452	0.000	2.915
14.5	2.953	2.525	0.000	5.478	2.354	1.696	0.000	4.050	1.906	1.766	0.000	3.673	1.888	1.712	0.000	3.600
15.5	3.443	2.537	0.000	5.979	3.427	2.571	0.000	5.998	2.205	1.641	0.000	3.846	1.541	1.469	0.000	3.009
16.5	2.937	3.107	0.000	6.044	4.598	3.436	0.000	8.034	2.186	1.856	0.000	4.042	1.737	1.557	0.000	3.294
17.5	1.758	2.939	0.000	4.697	3.980	3.202	0.000	7.182	3.447	1.882	0.010	5.339	1.967	1.448	0.000	3.415
18.5	0.825	1.668	0.000	2.492	3.589	2.730	0.000	6.320	2.995	2.030	0.000	5.025	1.853	1.378	0.000	3.231
19.5	0.630	1.364	0.000	1.994	1.981	2.897	0.000	4.878	1.729	2.935	0.000	4.664	1.569	1.574	0.000	3.143
20.5	0.177	1.101	0.000	1.279	1.090	1.730	0.000	2.820	0.910	2.505	0.000	3.415	0.976	1.695	0.000	2.671
21.5	0.068	1.070	0.000	1.137	0.133	1.129	0.000	1.262	0.507	2.602	0.000	3.110	0.405	2.379	0.000	2.784
22.5	0.027	0.763	0.000	0.790	0.222	0.747	0.000	0.969	0.095	1.732	0.000	1.827	0.148	2.176	0.000	2.324
23.5	0.014	0.607	0.000	0.621	0.000	0.569	0.000	0.569	0.032	1.439	0.000	1.471	0.052	1.897	0.000	1.949
24.5	0.000	0.409	0.000	0.409	0.000	0.687	0.000	0.687	0.010	0.935	0.000	0.945	0.000	1.489	0.000	1.489
25.5	0.000	0.581	0.000	0.581	0.014	0.435	0.000	0.449	0.000	0.839	0.000	0.839	0.015	1.181	0.000	1.196
26.5	0.000	0.474	0.000	0.474	0.000	0.604	0.000	0.604	0.000	0.629	0.000	0.629	0.004	1.049	0.000	1.053
27.5	0.000	0.465	0.000	0.465	0.000	0.150	0.000	0.150	0.000	0.248	0.000	0.248	0.000	0.691	0.000	0.691
28.5	0.000	0.346	0.000	0.346	0.000	0.302	0.000	0.302	0.000	0.308	0.000	0.308	0.010	0.373	0.000	0.384
29.5	0.000	0.263	0.000	0.263	0.000	0.241	0.000	0.241	0.000	0.196	0.000	0.196	0.011	0.354	0.000	0.365
30.5	0.000	0.227	0.000	0.227	0.000	0.209	0.000	0.209	0.000	0.102	0.000	0.102	0.000	0.283	0.000	0.283
31.5	0.000	0.087	0.000	0.087	0.000	0.236	0.000	0.236	0.000	0.132	0.000	0.132	0.000	0.212	0.000	0.212
32.5	0.000	0.071	0.000	0.071	0.000	0.040	0.000	0.040	0.000	0.088	0.000	0.088	0.000	0.069	0.000	0.069
33.5	0.000	0.063	0.000	0.063	0.000	0.010	0.000	0.010	0.000	0.038	0.000	0.038	0.000	0.026	0.000	0.026
34.5	0.000	0.028	0.000	0.028	0.000	0.085	0.000	0.085	0.000	0.031	0.000	0.031	0.000	0.082	0.000	0.082
35.5	0.000	0.027	0.000	0.027	0.000	0.080	0.000	0.080	0.000	0.010	0.000	0.010	0.000	0.049	0.000	0.049
36.5	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010	0.000	0.051	0.000	0.051	0.000	0.036	0.000	0.036
37.5	0.000	0.036	0.000	0.036	0.000	0.058	0.000	0.058	0.000	0.011	0.000	0.011	0.000	0.021	0.000	0.021
38.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.010	0.000	0.010
39.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
40.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.021
Total	23.273	29.977	0.892	54.141	30.527	32.075	0.263	62.865	25.636	32.682	0.226	58.544	19.995	30.647	0.903	51.545
Nº samples:																
Nº Ind.:				22				43				83				71
Sampled catch:	943	1268	37	2248	1188	1359	17	2564	2107	2423	25	4555	1589	2246	69	3904
Range:				1013				1579				2985				2712
Total catch:				2-38				2-37.5				1.5-39				2-41
Total hauls:				1013				1579				2985				2712

TABLE 11.- Swept area, number of hauls and **redfish** mean catch (Kg) and SD (**) by stratum. Spanish Survey in NAFO Div. 3L for the period 2003-2007, on board the R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0225	2	0.001	0.001	0.0229	2	0.005	0.007	0.0229	2	0.000	0.000	0.0225	2	0.041	0.027
387	0.0229	2	1.715	1.110	0.0214	2	56.000	51.619	0.0225	2	113.685	116.171	0.0225	2	80.400	34.083
388	0.0334	3	6.453	6.142	0.0105	1	11.800	-	0.0566	5	66.040	32.355	0.0563	5	162.078	100.787
389	0.0454	4	0.801	0.912	0.0225	2	33.050	44.901	0.0795	7	46.008	84.876	0.0900	8	10.723	18.542
390	0.0563	5	0.580	1.242	0.0345	3	0.000	0.000	0.1249	11	0.188	0.318	0.1350	12	0.173	0.473
391	0.0338	3	0.087	0.085	0.0218	2	1.435	1.718	0.0450	4	7.135	5.793	0.0450	4	6.013	6.351
392	0.0116	1	46.300	-	0.0214	2	1222.320	1712.075	0.0229	2	4367.190	5741.976	0.0225	2	959.650	350.230
729	0.0210	2	88.800	73.963	0.0221	2	310.250	239.780	0.0338	3	202.167	262.943	0.0338	3	128.889	184.792
730	0.0221	2	231.080	64.389	0.0221	2	55.550	72.761	0.0326	3	145.923	148.390	0.0225	2	367.737	518.964
731	0.0229	2	39.365	8.252	0.0233	2	79.550	68.236	0.0341	3	19.053	7.921	0.0338	3	37.100	28.646
732	0.0113	1	72.200	-	0.0210	2	42.025	55.119	0.0334	3	5.638	7.067	0.0338	3	12.115	13.539
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	111.667	109.389	0.0454	4	72.600	47.167	0.0338	3	115.667	70.383
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	5.383	7.029	0.0225	2	12.328	3.921	0.0225	2	24.728	28.585
741	0.0113	1	2240	-	0.0323	3	0.255	0.255	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0	-	0.0120	1	0.331	-	0.0229	2	0.000	0.000	0.0225	2	0.300	0.424
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	2.090	2.956	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.000	0.000	0.0218	2	0.479	0.677
745	0.0341	3	1753.1	3028.407	0.0319	3	0.000	0.000	0.0686	6	0.119	0.221	0.0675	6	0.380	0.450
746	0.0446	4	0	0	0.0338	3	0.000	0.000	0.0675	6	0.118	0.185	0.0664	6	0.000	0.000
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.200	0.346	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000
748	0.0109	1	2.7	-	0.0199	2	0.440	0.622	0.0326	3	0.130	0.225	0.0338	3	0.830	1.050
749	0.0221	2	0	0	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	0.000	0.000	0.1005	9	0.000	0.000	0.0679	6	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 12.- Stratified mean catches (Kg) and SD of **redfish** by stratum and year (2003-2007). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0.12	0.59	-	0.00	4.84
387	439.04	14336.00	-	29103.36	20582.40
388	2303.84	4212.60	-	23576.28	57861.85
389	407.58	16822.45	-	23418.22	5458.01
390	472.70	0.00	-	153.59	141.00
391	24.44	404.67	-	2012.07	1695.53
392	6713.50	177236.40	-	633242.55	139149.25
729	16516.80	57706.50	-	37603.00	23973.29
730	39283.60	9443.50	-	24806.97	62515.29
731	8502.84	17182.80	-	4115.52	8013.60
732	16678.20	9707.78	-	1302.46	2798.49
733	n.s	26130.00	-	16988.40	27066.00
734	n.s	823.65	-	1886.11	3783.31
741	224000.00	25.50	-	0.00	0.00
742	0.00	21.18	-	0.00	19.20
743	n.s	106.59	-	0.00	0.00
744	n.s	0.00	-	0.00	31.58
745	610078.80	0.00	-	41.47	132.24
746	0.00	0.00	-	46.39	0.00
747	n.s	144.80	-	0.00	0.00
748	429.30	69.96	-	20.67	131.97
749	0.00	0.00	-	0.00	0.00
750	n.s	0.00	-	0.00	0.00
751	n.s	n.s	-	0.00	0.00
TOTAL	925850.76	334374.97		798317.04	353357.83
$(\bar{y})$	206.94	53.43		123.06	54.47
SD	136.03	28.87		90.99	11.94

TABLE 13.- Survey estimates (by the swept area method) of **redfish** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V *"Vizconde de Eza"*). n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0	0	-	0	0
387	38	1341	-	2587	1830
388	207	401	-	2082	5143
389	36	1495	-	2062	485
390	42	0	-	14	13
391	2	37	-	179	151
392	578	16584	-	55365	12369
729	1573	5216	-	3342	2131
730	3551	854	-	2281	5557
731	743	1478	-	362	712
732	1483	925	-	117	249
733	n.s	2375	-	1498	2406
734	n.s	81	-	168	336
741	19911	2	-	0	0
742	0	2	-	0	2
743	n.s	11	-	0	0
744	n.s	0	-	0	3
745	53633	0	-	4	12
746	0	0	-	4	0
747	n.s	14	-	0	0
748	39	7	-	2	12
749	0	0	-	0	0
750	n.s	0	-	0	0
751	n.s	n.s	-	0	0
TOTAL	81837	30825		70066	31410
SD	50717	17163		50718	6885

TABLE 14.- Redfish length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey in NAFO 3L: 2003-2007 (R/V *"Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	2003 (*)				2004				2006				2007			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
4	0.000	0.000	0.195	0.195	0.000	0.000	0.044	0.044	0.000	0.012	0.000	0.012	0.000	0.000	0.044	0.044
6	0.000	0.000	7.290	7.290	0.000	0.000	3.677	3.677	0.099	0.049	2.832	2.980	0.000	0.000	17.446	17.446
8	0.032	0.092	1.641	1.765	0.244	0.087	5.055	5.386	0.898	1.282	13.679	15.859	0.010	0.187	26.862	27.060
10	1.237	0.697	0.706	2.640	3.475	2.031	1.693	7.199	2.184	1.277	1.817	5.278	1.451	2.169	1.641	5.261
12	2.752	1.188	0.000	3.940	4.862	3.304	4.929	13.094	3.000	3.275	0.121	6.395	4.450	3.714	0.530	8.693
14	3.744	28.780	0.000	32.524	3.923	1.826	2.164	7.912	11.245	8.431	0.000	19.676	3.435	1.800	0.011	5.246
16	3.177	1.411	0.000	4.588	8.873	5.168	0.262	14.303	20.688	19.489	0.000	40.177	5.966	3.806	0.000	9.771
18	4.389	27.403	0.000	31.791	11.871	12.090	0.000	23.961	14.289	13.658	0.000	27.947	11.847	13.077	0.000	24.924
20	6.001	4.175	0.000	10.176	23.037	20.029	0.000	43.067	23.653	11.009	0.000	34.662	25.500	15.852	0.000	41.353
22	5.981	5.110	0.000	11.091	19.463	18.469	0.000	37.932	41.880	31.008	0.000	72.888	36.002	30.404	0.000	66.406
24	65.488	63.971	0.000	129.459	30.922	12.776	0.000	43.698	40.394	44.208	0.000	84.602	19.885	32.599	0.000	52.484
26	11.519	141.787	0.000	153.306	35.905	14.433	0.000	50.339	9.497	58.297	0.000	67.794	7.338	11.292	0.000	18.630
28	52.415	5.791	0.000	58.206	16.796	12.423	0.000	29.219	8.686	64.054	0.000	72.740	4.692	6.693	0.000	11.385
30	54.149	82.477	0.000	136.626	5.362	5.646	0.000	11.008	6.121	47.610	0.000	53.730	4.327	5.569	0.000	9.896
32	56.440	29.715	0.000	86.155	0.521	2.704	0.000	3.225	4.127	23.729	0.000	27.856	5.484	7.420	0.000	12.903
34	1.451	29.513	0.000	30.965	0.163	0.593	0.000	0.756	0.724	3.743	0.000	4.467	2.656	2.821	0.000	5.477
36	0.180	0.649	0.000	0.829	0.295	0.367	0.000	0.662	0.124	2.145	0.000	2.269	0.203	0.962	0.000	1.165
38	0.088	0.000	0.000	0.088	0.125	0.046	0.000	0.171	0.079	1.046	0.000	1.124	0.051	0.134	0.000	0.185
40	0.000	0.034	0.000	0.034	0.000	0.000	0.000	0.000	0.020	0.014	0.000	0.034	0.022	0.034	0.000	0.056
42	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010	0.013	0.026	0.000	0.038
44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.012
46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.000	0.026	0.000	0.000	0.000	0.000
48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.013	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.013
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010
Total	269.04	422.79	9.83	701.67	165.84	111.99	17.82	295.65	187.71	334.38	18.45	540.54	133.36	138.57	46.53	318.46
Nº samples:																
Nº Ind.:				22				28				48				51
Sampled catch:	965	799	304	2068	1903	1662	409	3974	3205	3089	1205	7499	2669	2360	2016	7045
Range:				8366				3970				11080				4675
Total catch:				5-40				5-39				5-48				5-53
Total hauls:				8368				3970				11080				4675

TABLE 15.- Swept area, number of hauls and **thorny skate** mean catch (Kg) and SD (**) by stratum. Spanish Survey in NAFO Div. 3L for the period 2003-2007, on board the R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	7.050	9.970	0.0229	2	6.044	4.588	0.0225	2	30.260	11.653
387	0.0229	2	5.295	4.957	0.0214	2	10.700	2.263	0.0225	2	16.438	16.599	0.0225	2	32.485	2.143
388	0.0334	3	13.273	13.347	0.0105	1	16.700		0.0566	5	44.186	24.414	0.0563	5	31.096	13.246
389	0.0454	4	5.984	5.117	0.0225	2	10.900	13.294	0.0795	7	32.979	14.712	0.0900	8	25.861	11.704
390	0.0563	5	0.190	0.425	0.0345	3	1.997	1.730	0.1249	11	5.529	7.479	0.1350	12	7.366	7.441
391	0.0338	3	1.723	1.509	0.0218	2	64.250	65.125	0.0450	4	151.088	51.460	0.0450	4	100.658	56.818
392	0.0116	1	10.050	-	0.0214	2	62.300	0.141	0.0229	2	149.500	165.604	0.0225	2	330.100	170.554
729	0.0210	2	54.955	31.176	0.0221	2	140.375	186.712	0.0338	3	49.261	27.663	0.0338	3	164.760	243.624
730	0.0221	2	71.400	60.670	0.0221	2	0.000	0.000	0.0326	3	4.348	7.532	0.0225	2	0.000	0.000
731	0.0229	2	38.705	25.873	0.0233	2	18.510	22.330	0.0341	3	46.757	62.791	0.0338	3	57.448	64.552
732	0.0113	1	76.200		0.0210	2	0.000	0.000	0.0334	3	2.015	1.851	0.0338	3	0.000	0.000
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	9.363	5.299	0.0454	4	14.573	8.911	0.0338	3	6.427	8.497
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
741	0.0113	1	0	-	0.0323	3	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0	-	0.0120	1	0.000		0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000		0.0229	2	0.000	0.000	0.0218	2	0.000	0.000
745	0.0341	3	22.077	21.917	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.000	0.000
746	0.0446	4	2.318	3.703	0.0338	3	0.000	0.000	0.0675	6	0.000	0.000	0.0664	6	0.000	0.000
747	n.s.	n.s.			0.0308	3	0.000	0.000	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000
748	0.0109	1	65.220	-	0.0199	2	0.000	0.000	0.0326	3	0.837	1.449	0.0338	3	0.000	0.000
749	0.0221	2	8.060	6.067	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	1.375	1.945	0.1005	9	0.393	1.180	0.0679	6	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

Table 16.- Length-weight relationships in the calculation of biomass, for Division 3L (out ZEE Canada), 2003-2007 for the thorny skate and black dogfish. The equation is $Weight=a(Length+0.5)^b$. To calculate the parameters for the indeterminate individuals, we used the total data (males+females+indeterminate individuals).

Year	Sex	Length-Weight Equations	N	r^2
Thorny skate				
2003	All	$W = 0.0050\ L^{3.1712}$	305	0.9896
	Males	$W = 0.0051\ L^{3.1619}$	141	0.9906
	Females	$W = 0.0048\ L^{3.1855}$	164	0.9888
2004	All	$W = 0.0067\ L^{3.1187}$	186	0.9661
	Males	$W = 0.0054\ L^{3.1684}$	94	0.9700
	Females	$W = 0.0086\ L^{3.0629}$	92	0.9639
2006	All	$W = 0.0084\ L^{3.0587}$	491	0.9830
	Males	$W = 0.0103\ L^{3.0011}$	210	0.9847
	Females	$W = 0.0061\ L^{3.1402}$	281	0.9814
2007	All	$W = 0.0080\ L^{3.0609}$	539	0.9848
	Males	$W = 0.0091\ L^{3.0242}$	255	0.9868
	Females	$W = 0.0072\ L^{3.0929}$	284	0.9839
Black dogfish				
2003	All	$W = 0.0081\ L^{2.8882}$	20	0.9637327
	Males	$W = 0.1143\ L^{2.2194}$	5	0.9381904
	Females	$W = 0.0072\ L^{2.9265}$	15	0.9782095
2004	All	$W = 0.0025\ L^{3.1608}$	113	0.9592316
	Males	$W = 0.0272\ L^{2.5776}$	58	0.8969346
	Females	$W = 0.0013\ L^{3.3314}$	55	0.9808791
2006	All	$W = 0.0011\ L^{3.3758}$	283	0.9215765
	Males	$W = 0.0071\ L^{2.9000}$	99	0.923292
	Females	$W = 0.0008\ L^{3.4608}$	184	0.9363115
2007	All	$W = 0.0008\ L^{3.4421}$	362	0.9154611
	Males	$W = 0.0099\ L^{2.8281}$	147	0.9028648
	Females	$W = 0.0006\ L^{3.5445}$	215	0.9372968

TABLE 17.- Stratified mean catches (Kg) and SD of **thorny skate** by stratum and year (2003-2007). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0.00	831.90	-	713.19	3570.68
387	1355.52	2739.20	-	4208.00	8316.16
388	4738.58	5961.90	-	15774.40	11101.27
389	3045.60	5548.10	-	16786.09	13163.25
390	154.85	1627.28	-	4506.21	6003.36
391	485.98	18118.50	-	42606.68	28385.42
392	1457.25	9033.50	-	21677.50	47864.50
729	10221.63	26109.75	-	9162.48	30645.36
730	12138.00	0.00	-	739.22	0.00
731	8360.28	3998.16	-	10099.44	12408.84
732	17602.20	0.00	-	465.47	0.00
733	n.s	2191.02	-	3410.14	1503.84
734	n.s	0.00	-	0.00	0.00
741	0.00	0.00	-	0.00	0.00
742	0.00	0.00	-	0.00	0.00
743	n.s	0.00	-	0.00	0.00
744	n.s	0.00	-	0.00	0.00
745	7682.68	0.00	-	0.00	0.00
746	908.46	0.00	-	0.00	0.00
747	n.s	0.00	-	0.00	0.00
748	10369.98	0.00	-	133.03	0.00
749	1015.56	0.00	-	0.00	0.00
750	n.s	764.50	-	218.69	0.00
751	n.s	n.s	-	0.00	0.00
TOTAL	79536.57	76923.81		130500.54	162962.67
$(\bar{y})$	17.78	12.29		20.12	25.12
SD	2.41	4.54		3.27	5.19

TABLE 18.- Survey estimates (by the swept area method) of **thorny skate** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V *"Vizconde de Eza"*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0	73	-	62	317
387	119	256	-	374	739
388	426	568	-	1393	987
389	268	493	-	1478	1170
390	14	142	-	397	534
391	43	1666	-	3787	2523
392	125	845	-	1895	4255
729	973	2360	-	814	2724
730	1097	0	-	68	0
731	731	344	-	888	1103
732	1565	0	-	42	0
733	n.s	199	-	301	134
734	n.s	0	-	0	0
741	0	0	-	0	0
742	0	0	-	0	0
743	n.s	0	-	0	0
744	n.s	0	-	0	0
745	675	0	-	0	0
746	81	0	-	0	0
747	n.s	0	-	0	0
748	954	0	-	12	0
749	92	0	-	0	0
750	n.s	85	-	20	0
751	n.s	n.s	-	0	0
TOTAL	7164	7031		11531	14486
SD	942	2642		1887	2993

TABLE 19.- Thorny skate length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey in NAFO 3L: 2003-2007 (R/V *"Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	2003 (*)				2004				2006				2007			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
10	0.000	0.023	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	0.089	0.065	0.000	0.154	0.000	0.000	0.000	0.000	0.041	0.009	0.000	0.050	0.161	0.079	0.000	0.239
14	0.190	0.076	0.000	0.266	0.040	0.000	0.000	0.040	0.087	0.000	0.000	0.087	0.084	0.123	0.000	0.207
16	0.000	0.030	0.000	0.030	0.000	0.000	0.000	0.000	0.042	0.029	0.000	0.071	0.054	0.098	0.000	0.151
18	0.000	0.000	0.000	0.000	0.023	0.000	0.000	0.023	0.034	0.022	0.000	0.056	0.132	0.122	0.000	0.254
20	0.000	0.030	0.000	0.030	0.000	0.024	0.000	0.024	0.029	0.031	0.000	0.060	0.175	0.101	0.000	0.276
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.031	0.000	0.031	0.155	0.189	0.000	0.344
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.011	0.000	0.045	0.131	0.143	0.000	0.274
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.133	0.163	0.000	0.296
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.011	0.000	0.034	0.100	0.056	0.000	0.156
30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.000	0.033	0.075	0.045	0.000	0.120
32	0.068	0.023	0.000	0.091	0.012	0.023	0.000	0.035	0.034	0.011	0.000	0.046	0.077	0.055	0.000	0.132
34	0.049	0.083	0.000	0.132	0.015	0.000	0.000	0.015	0.012	0.035	0.000	0.046	0.089	0.034	0.000	0.123
36	0.191	0.201	0.000	0.392	0.012	0.000	0.000	0.012	0.023	0.011	0.000	0.034	0.056	0.054	0.000	0.110
38	0.233	0.403	0.000	0.636	0.000	0.000	0.000	0.000	0.000	0.035	0.000	0.035	0.055	0.056	0.000	0.111
40	0.138	0.431	0.000	0.569	0.044	0.052	0.000	0.097	0.045	0.034	0.000	0.079	0.021	0.011	0.000	0.032
42	0.348	0.653	0.000	1.000	0.068	0.067	0.000	0.135	0.000	0.033	0.000	0.033	0.034	0.056	0.000	0.090
44	0.315	0.610	0.000	0.925	0.099	0.253	0.000	0.351	0.011	0.034	0.000	0.045	0.042	0.042	0.000	0.085
46	0.229	0.462	0.000	0.691	0.141	0.142	0.000	0.283	0.092	0.082	0.000	0.174	0.051	0.086	0.000	0.137
48	0.422	0.514	0.000	0.936	0.174	0.121	0.000	0.296	0.103	0.078	0.000	0.181	0.053	0.086	0.000	0.139
50	0.347	0.340	0.000	0.687	0.259	0.239	0.000	0.498	0.133	0.172	0.000	0.305	0.119	0.132	0.000	0.251
52	0.569	0.364	0.000	0.933	0.350	0.256	0.000	0.606	0.219	0.134	0.000	0.353	0.094	0.146	0.000	0.240
54	0.321	0.319	0.000	0.640	0.328	0.143	0.000	0.471	0.267	0.370	0.000	0.637	0.207	0.237	0.000	0.443
56	0.557	0.434	0.000	0.991	0.324	0.231	0.000	0.555	0.218	0.237	0.000	0.455	0.191	0.340	0.000	0.531
58	0.246	0.388	0.000	0.634	0.321	0.240	0.000	0.562	0.216	0.459	0.000	0.675	0.303	0.272	0.000	0.575
60	0.172	0.263	0.000	0.435	0.410	0.200	0.000	0.610	0.363	0.385	0.000	0.748	0.270	0.591	0.000	0.862
62	0.363	0.141	0.000	0.504	0.111	0.152	0.000	0.264	0.221	0.535	0.000	0.756	0.462	0.758	0.000	1.220
64	0.278	0.171	0.000	0.449	0.177	0.193	0.000	0.371	0.410	0.537	0.000	0.948	0.419	0.624	0.000	1.042
66	0.104	0.019	0.000	0.123	0.222	0.144	0.000	0.367	0.339	0.385	0.000	0.725	0.340	0.537	0.000	0.877
68	0.058	0.152	0.000	0.209	0.116	0.053	0.000	0.168	0.173	0.410	0.000	0.583	0.372	0.645	0.000	1.016
70	0.103	0.039	0.000	0.142	0.053	0.023	0.000	0.076	0.189	0.216	0.000	0.405	0.249	0.376	0.000	0.624
72	0.065	0.077	0.000	0.142	0.061	0.000	0.000	0.061	0.076	0.134	0.000	0.210	0.183	0.244	0.000	0.427
74	0.065	0.021	0.000	0.086	0.000	0.000	0.000	0.000	0.089	0.067	0.000	0.156	0.119	0.128	0.000	0.247
76	0.019	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.078	0.054	0.000	0.132	0.044	0.053	0.000	0.097
78	0.054	0.000	0.000	0.054	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.032	0.031	0.000	0.063
80	0.019	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.023	0.010	0.000	0.000	0.010
82	0.000	0.019	0.000	0.019	0.077	0.000	0.000	0.077	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011
84	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
86	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
88	0.044	0.000	0.000	0.044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	5.657	6.353	0.000	12.010	3.438	2.556	0.000	5.994	3.611	4.663	0.000	8.275	5.101	6.711	0.000	11.811
Nº samples:																
Nº Ind.:				26				18				42				43
Sampled catch:	197	226	0	423	170	135	0	305	312	420	0	732	457	621	0	1078
Range:				648				617				1832				2325
Total catch:				11-89				14-83				13-81				12-82
Total hauls:				654				682				1832				2325

TABLE 20.- Swept area, number of hauls and **black dogfish** mean catch (Kg) and SD (**) by stratum. Spanish Survey in NAFO Div. 3L for the period 2003-2007, on board the R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
387	0.0229	2	0.000	0.000	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
388	0.0334	3	0.000	0.000	0.0105	1	0.000	-	0.0566	5	0.000	0.000	0.0563	5	0.000	0.000
389	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000	0.0795	7	0.000	0.000	0.0900	8	0.000	0.000
390	0.0563	5	0.000	0.000	0.0345	3	0.000	0.000	0.1249	11	0.000	0.000	0.1350	12	0.000	0.000
391	0.0338	3	0.000	0.000	0.0218	2	0.000	0.000	0.0450	4	0.000	0.000	0.0450	4	0.000	0.000
392	0.0116	1	0.000	-	0.0214	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
729	0.0210	2	0.000	0.000	0.0221	2	0.000	0.000	0.0338	3	0.000	0.000	0.0338	3	0.000	0.000
730	0.0221	2	0.000	0.000	0.0221	2	2.175	3.076	0.0326	3	3.690	6.391	0.0225	2	19.488	26.067
731	0.0229	2	0.000	0.000	0.0233	2	0.000	0.000	0.0341	3	0.000	0.000	0.0338	3	0.000	0.000
732	0.0113	1	0.000	-	0.0210	2	0.000	0.000	0.0334	3	0.000	0.000	0.0338	3	0.000	0.000
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	0.000	0.000	0.0454	4	0.000	0.000	0.0338	3	0.000	0.000
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
741	0.0113	1	0	-	0.0323	3	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0	-	0.0120	1	0.000	-	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.626	0.862	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.725	1.025	0.0218	2	1.663	0.541
745	0.0341	3	0.007	0.012	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.000	0.000
746	0.0446	4	0	0	0.0338	3	0.000	0.000	0.0675	6	9.033	10.572	0.0664	6	9.171	6.742
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	4.067	3.591	0.1230	11	3.656	2.707	0.1238	11	6.015	5.815
748	0.0109	1	0	-	0.0199	2	36.980	52.298	0.0326	3	15.713	18.383	0.0338	3	35.817	40.266
749	0.0221	2	219.750	310.773	0.0221	2	17.300	5.515	0.0229	2	91.125	124.599	0.0113	1	229.700	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	2.800	3.960	0.1005	9	6.213	9.605	0.0679	6	13.979	28.671
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	1.103	1.497	0.0225	2	4.405	0.191

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 21.- Stratified mean catches (Kg) and SD of **black dogfish** by stratum and year (2003-2007). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0.00	0.00	-	0.00	0.00
387	0.00	0.00	-	0.00	0.00
388	0.00	0.00	-	0.00	0.00
389	0.00	0.00	-	0.00	0.00
390	0.00	0.00	-	0.00	0.00
391	0.00	0.00	-	0.00	0.00
392	0.00	0.00	-	0.00	0.00
729	0.00	0.00	-	0.00	0.00
730	0.00	369.75	-	627.30	3312.88
731	0.00	0.00	-	0.00	0.00
732	0.00	0.00	-	0.00	0.00
733	n.s	0.00	-	0.00	0.00
734	n.s	0.00	-	0.00	0.00
741	0.00	0.00	-	0.00	0.00
742	0.00	0.00	-	0.00	0.00
743	n.s	31.90	-	0.00	0.00
744	n.s	0.00	-	47.85	109.73
745	2.32	0.00	-	0.00	0.00
746	0.00	0.00	-	3541.07	3594.84
747	n.s	2944.27	-	2646.94	4354.53
748	0.00	5879.82	-	2498.42	5694.85
749	27688.50	2179.80	-	11481.75	28942.20
750	n.s	1556.80	-	3454.61	7772.42
751	n.s	n.s	-	252.47	1008.75
TOTAL	27690.82	12962.34		24550.42	54790.18
$(\bar{y})$	6.19	2.07		3.78	8.45
SD	6.19	1.01		1.78	1.28

TABLE 22.- Survey estimates (by the swept area method) of **black dogfish** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V "*Vizconde de Eza*"). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	Survey				
Stratum	2003	2004	2005	2006	2007
385	0	0	-	0	0
387	0	0	-	0	0
388	0	0	-	0	0
389	0	0	-	0	0
390	0	0	-	0	0
391	0	0	-	0	0
392	0	0	-	0	0
729	0	0	-	0	0
730	0	33	-	58	294
731	0	0	-	0	0
732	0	0	-	0	0
733	n.s	0	-	0	0
734	n.s	0	-	0	0
741	0	0	-	0	0
742	0	0	-	0	0
743	n.s	3	-	0	0
744	n.s	0	-	4	10
745	0	0	-	0	0
746	0	0	-	315	325
747	n.s	287	-	237	387
748	0	592	-	230	506
749	2503	197	-	1004	2573
750	n.s	173	-	309	687
751	n.s	n.s	-	22	90
TOTAL	2503	1286		2179	4872
SD	2546	695		994	721

TABLE 23.- Black dogfish length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey in NAFO 3L: 2003-2007 (R/V *"Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

	2003 (*)				2004				2006				2007			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
16	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
34	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
36	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
38	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.009	0.008	0.000	0.000	0.008
42	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.013	0.009	0.009	0.000	0.018	0.000	0.030	0.000	0.030
44	0.000	0.056	0.000	0.056	0.000	0.000	0.000	0.000	0.017	0.028	0.000	0.045	0.017	0.000	0.000	0.017
46	0.000	0.056	0.000	0.056	0.000	0.000	0.000	0.000	0.019	0.017	0.000	0.036	0.008	0.035	0.000	0.043
48	0.028	0.056	0.000	0.084	0.013	0.022	0.000	0.036	0.046	0.019	0.000	0.064	0.008	0.024	0.000	0.032
50	0.084	0.084	0.000	0.168	0.026	0.058	0.000	0.084	0.000	0.026	0.000	0.026	0.030	0.095	0.000	0.125
52	0.197	0.225	0.000	0.421	0.035	0.066	0.000	0.101	0.034	0.063	0.000	0.097	0.050	0.064	0.000	0.114
54	0.197	0.309	0.000	0.505	0.062	0.052	0.000	0.114	0.037	0.056	0.000	0.093	0.106	0.176	0.000	0.283
56	0.337	0.590	0.000	0.927	0.019	0.123	0.000	0.142	0.045	0.064	0.000	0.108	0.110	0.136	0.000	0.246
68	0.281	0.477	0.000	0.758	0.130	0.062	0.000	0.192	0.083	0.116	0.000	0.200	0.281	0.356	0.000	0.637
70	0.393	0.393	0.000	0.786	0.114	0.190	0.000	0.305	0.145	0.145	0.000	0.290	0.454	0.222	0.000	0.676
72	0.197	0.281	0.000	0.477	0.080	0.152	0.000	0.232	0.113	0.232	0.000	0.345	0.652	0.450	0.000	1.101
74	0.337	0.281	0.000	0.618	0.094	0.004	0.000	0.098	0.165	0.185	0.000	0.350	0.379	0.390	0.000	0.769
76	0.197	0.253	0.000	0.449	0.133	0.101	0.000	0.234	0.138	0.184	0.000	0.321	0.225	0.287	0.000	0.512
78	0.028	0.084	0.000	0.112	0.013	0.069	0.000	0.082	0.070	0.137	0.000	0.207	0.127	0.254	0.000	0.381
80	0.000	0.056	0.000	0.056	0.039	0.069	0.000	0.109	0.010	0.145	0.000	0.155	0.055	0.238	0.000	0.292
82	0.000	0.028	0.000	0.028	0.013	0.000	0.000	0.013	0.010	0.146	0.000	0.156	0.000	0.245	0.000	0.245
84	0.000	0.028	0.000	0.028	0.000	0.032	0.000	0.032	0.000	0.108	0.000	0.108	0.000	0.211	0.000	0.211
Total	2.275	3.314	0.000	5.588	0.784	1.006	0.000	1.790	0.941	1.766	0.000	2.707	2.510	3.410	0.000	5.921
Nº samples:																
Nº Ind.:				1				8				28				28
Sampled catch:	81	118	0	199	58	55	0	113	99	184	0	283	179	245	0	424
Range:				440				127				397				593
Total catch:				44-79				17-75				41-84				41-81
Total hauls:				440				132				397				593

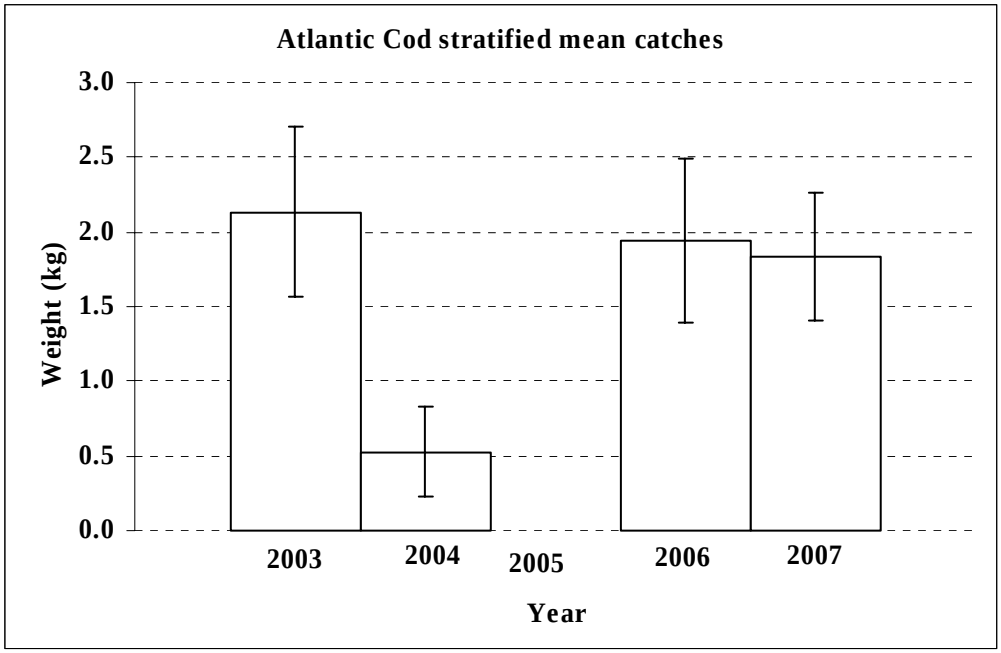

FIGURE 1.- Atlantic cod stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

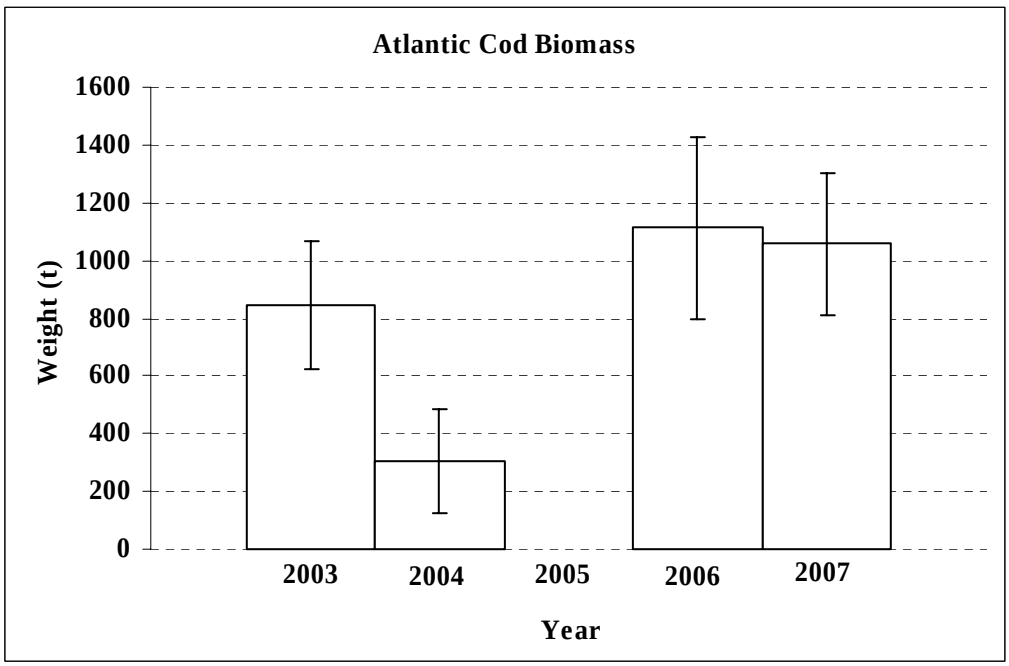

FIGURE 2.- Atlantic cod biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

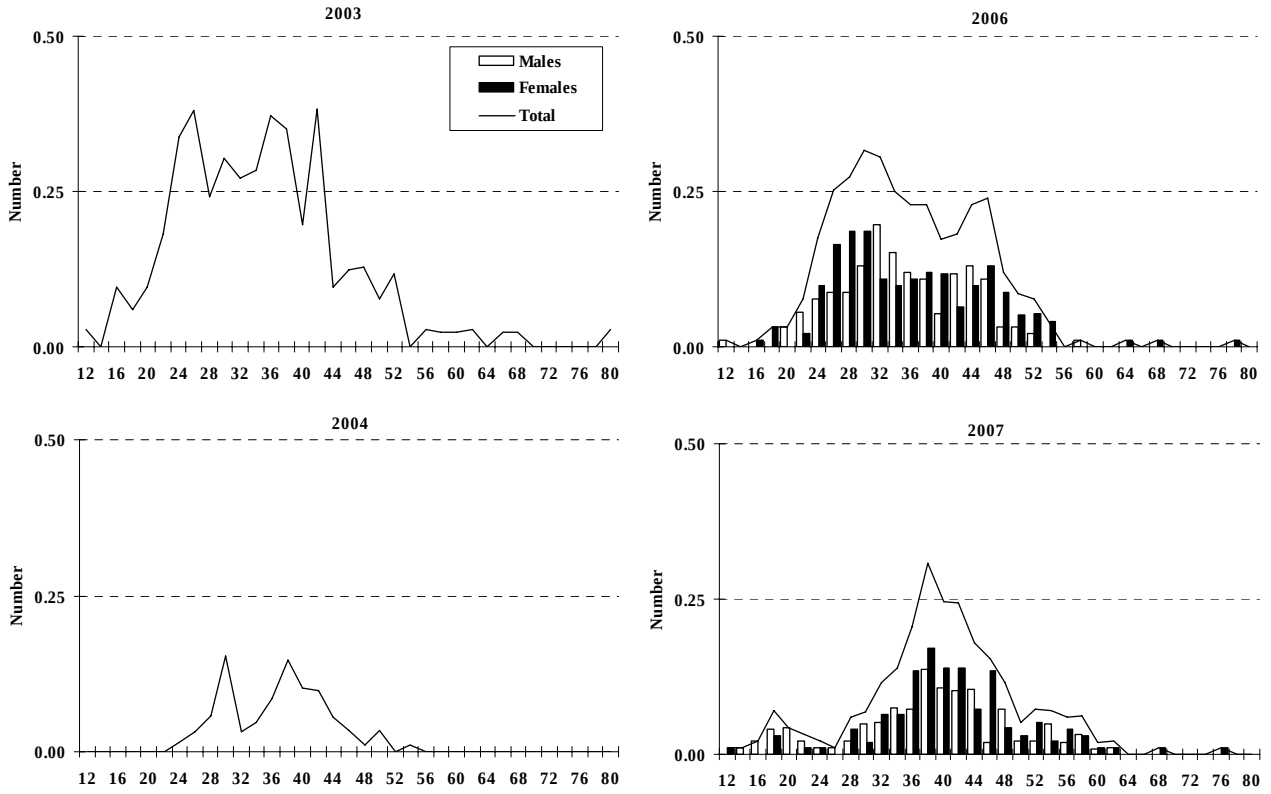

FIGURE 3.- Atlantic cod length distribution (cm) in NAFO 3L: 2003-2007. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

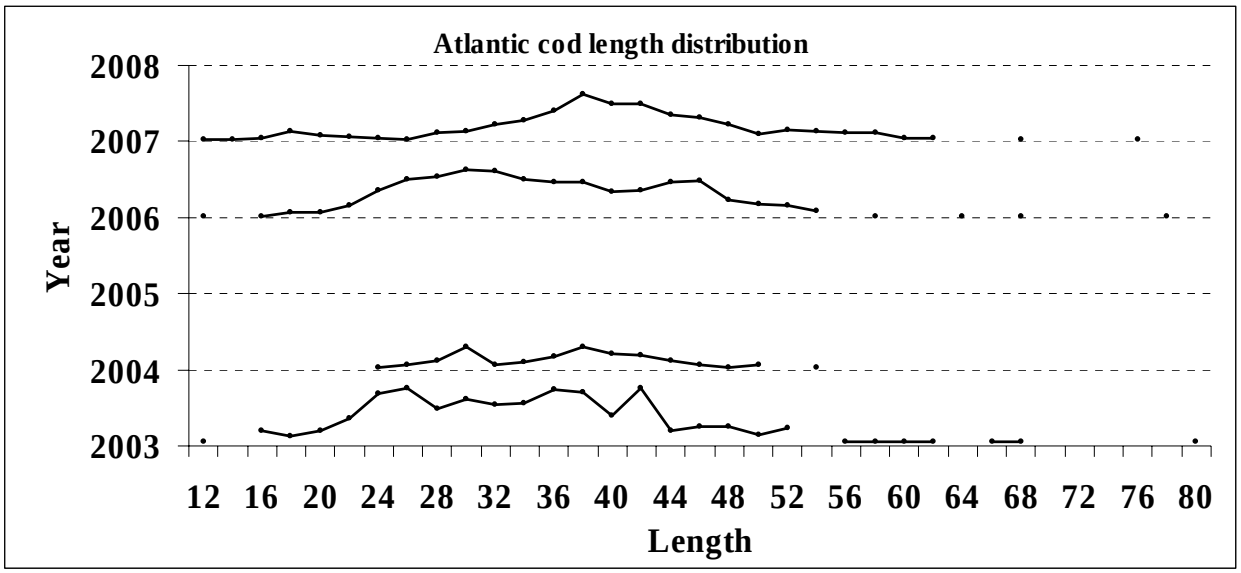

FIGURE 4.- Atlantic cod length distribution (cm) in NAFO 3L: 2003-2007.

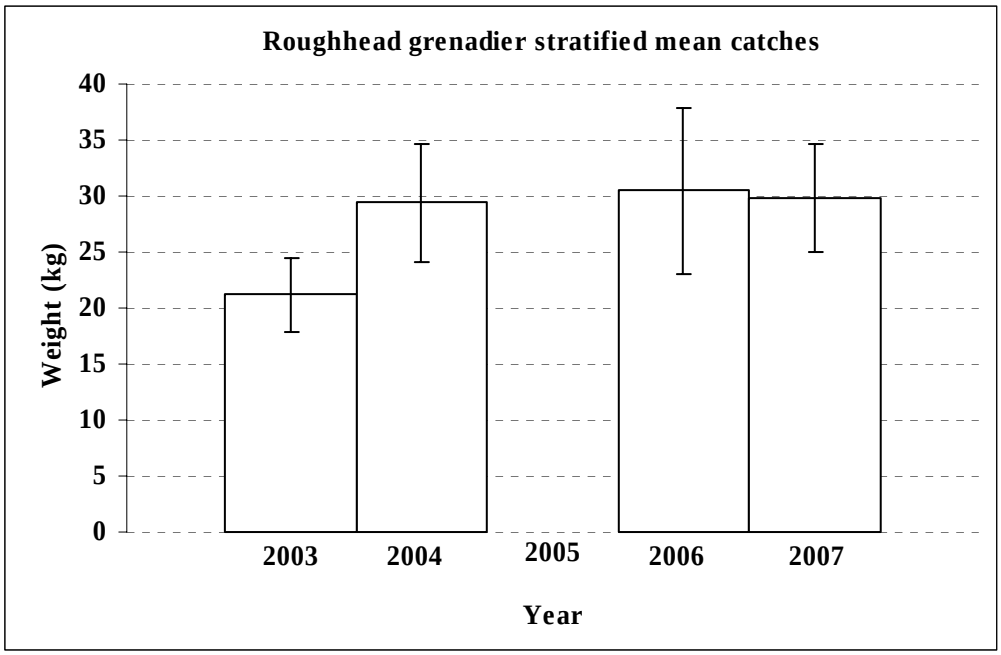

FIGURE 5.- Roughhead grenadier stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

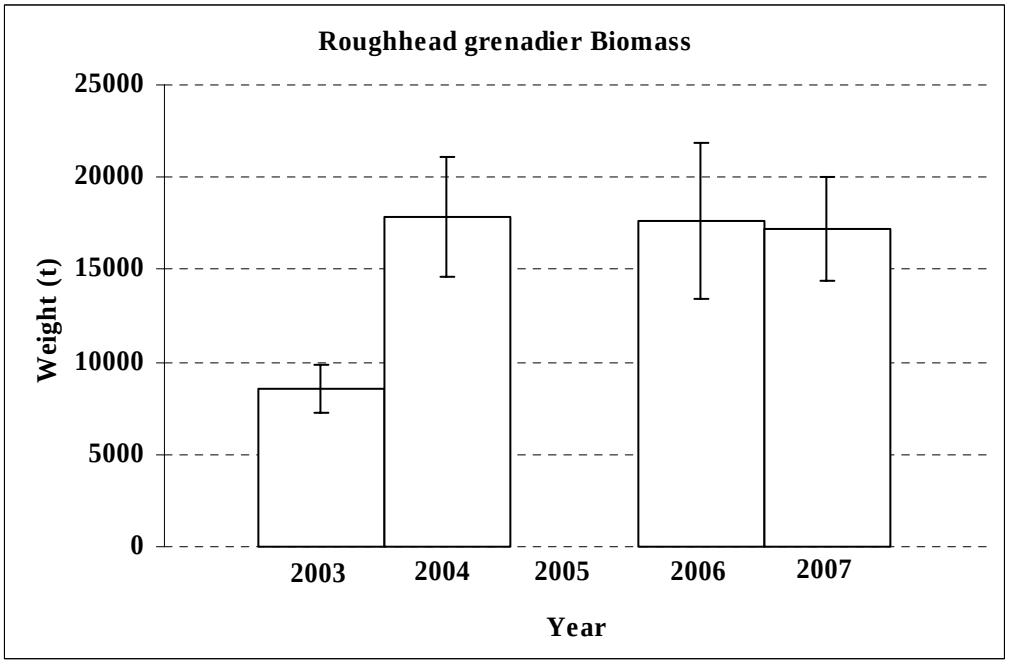

FIGURE 6.- Roughhead grenadier biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

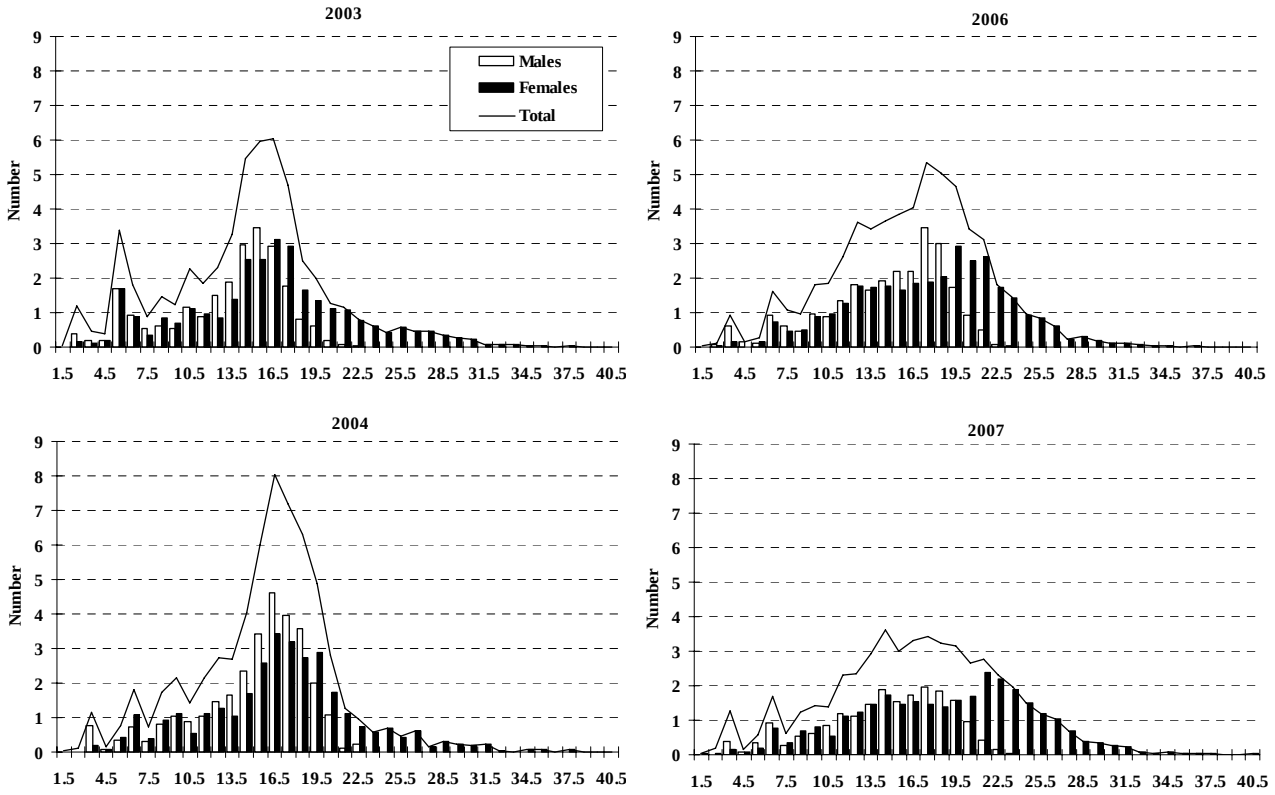

FIGURE 7.- Roughhead grenadier length distribution (cm) in NAFO 3L: 2003-2007. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

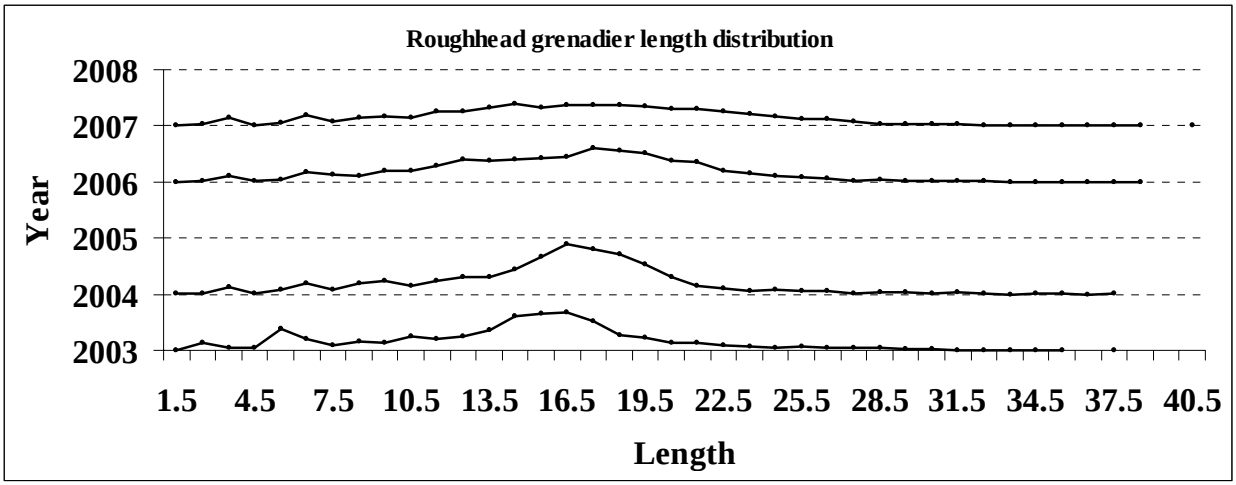

FIGURE 8.- Roughhead grenadier length distribution (cm) in NAFO 3L: 2003-2007.

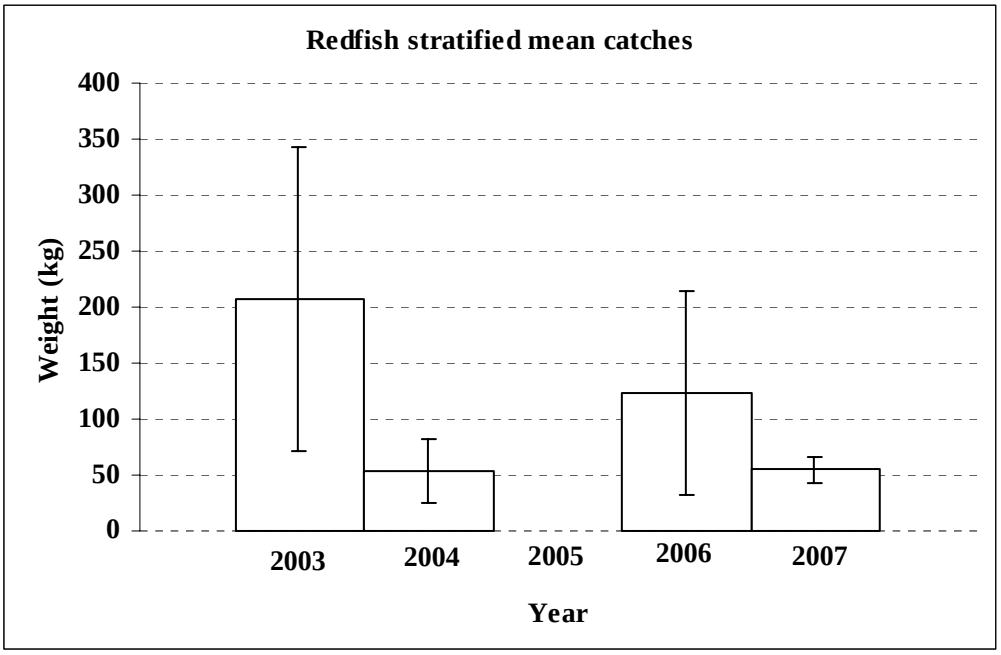

FIGURE 9.- Redfish stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

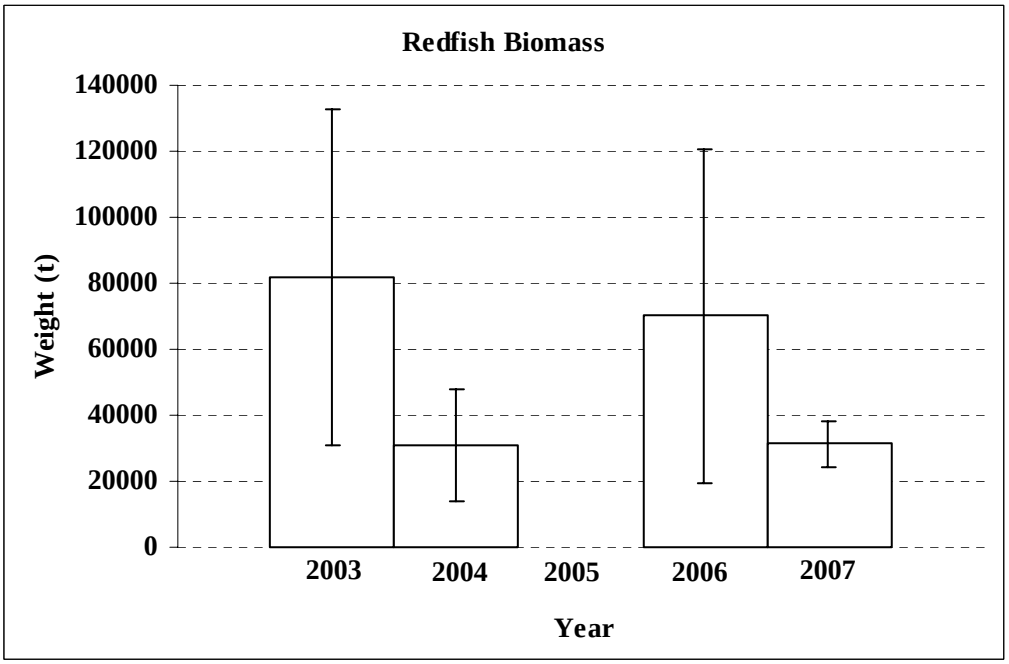

FIGURE 10.- Redfish biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

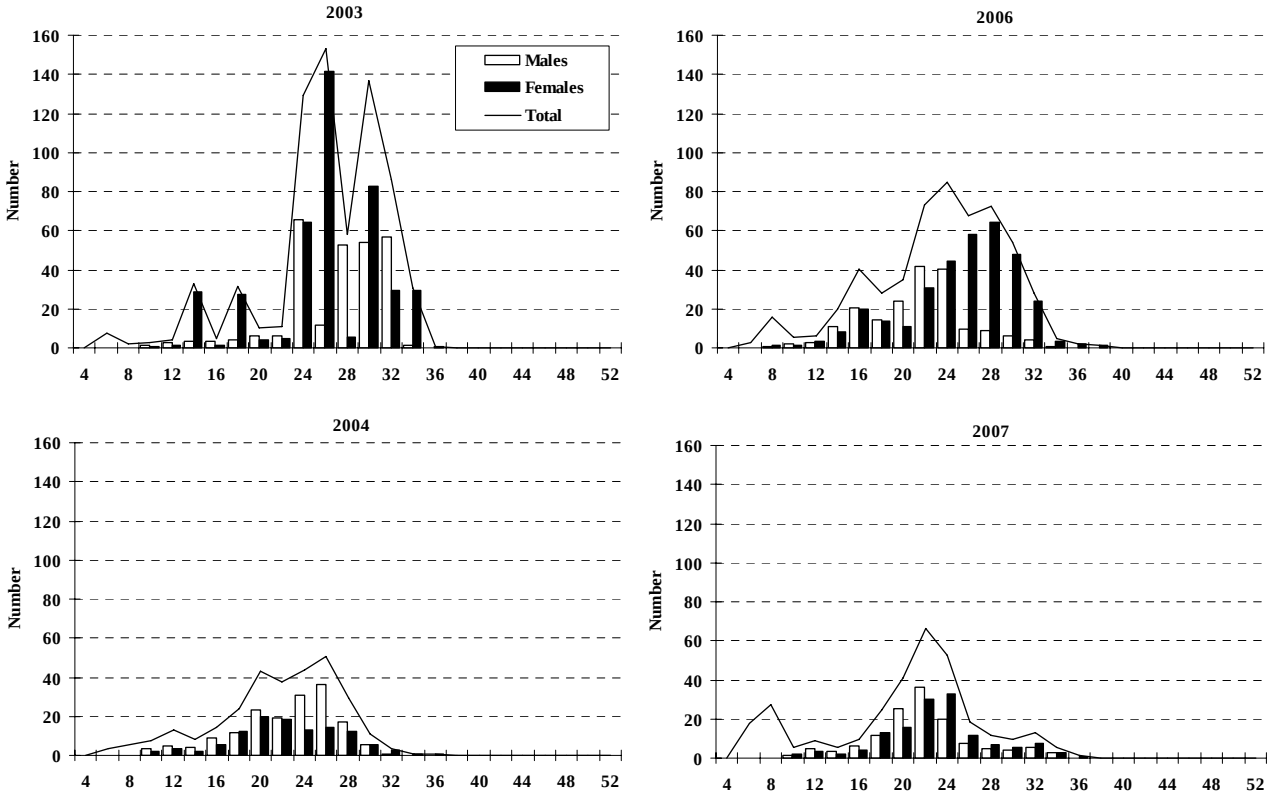

FIGURE 11.- Redfish length distribution (cm) in NAFO 3L: 2003-2007. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

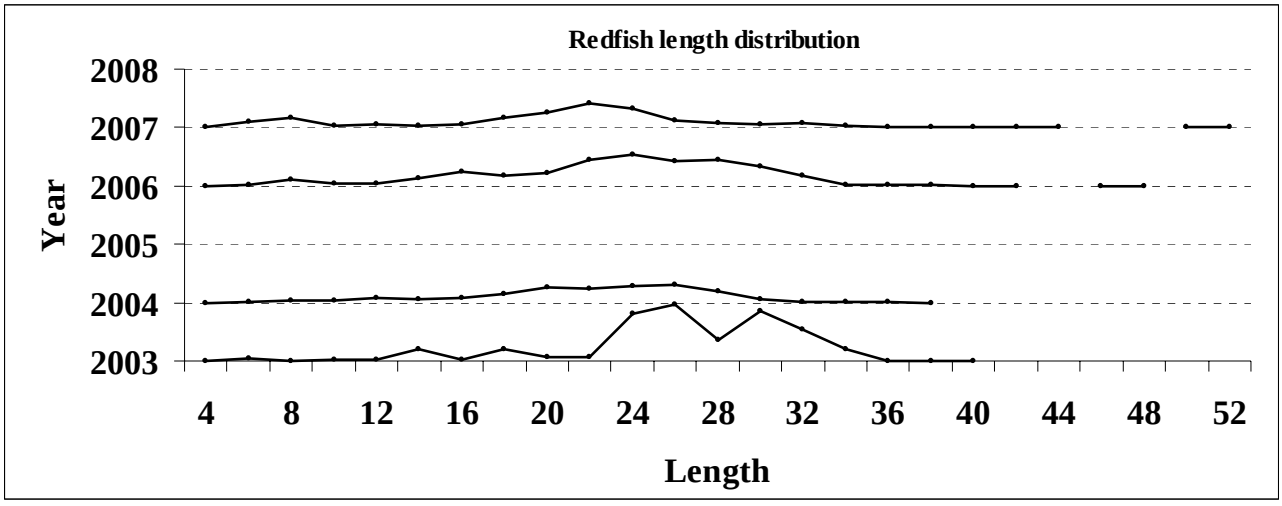

FIGURE 12.- Redfish length distribution (cm) in NAFO 3L: 2003-2007.

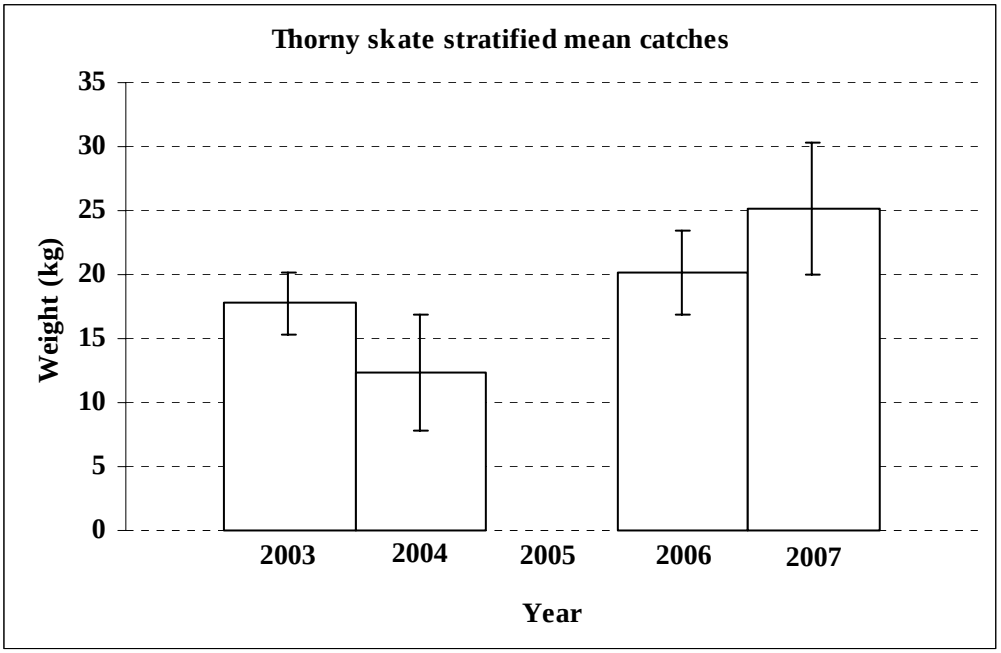

FIGURE 13.- Thorny skate stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

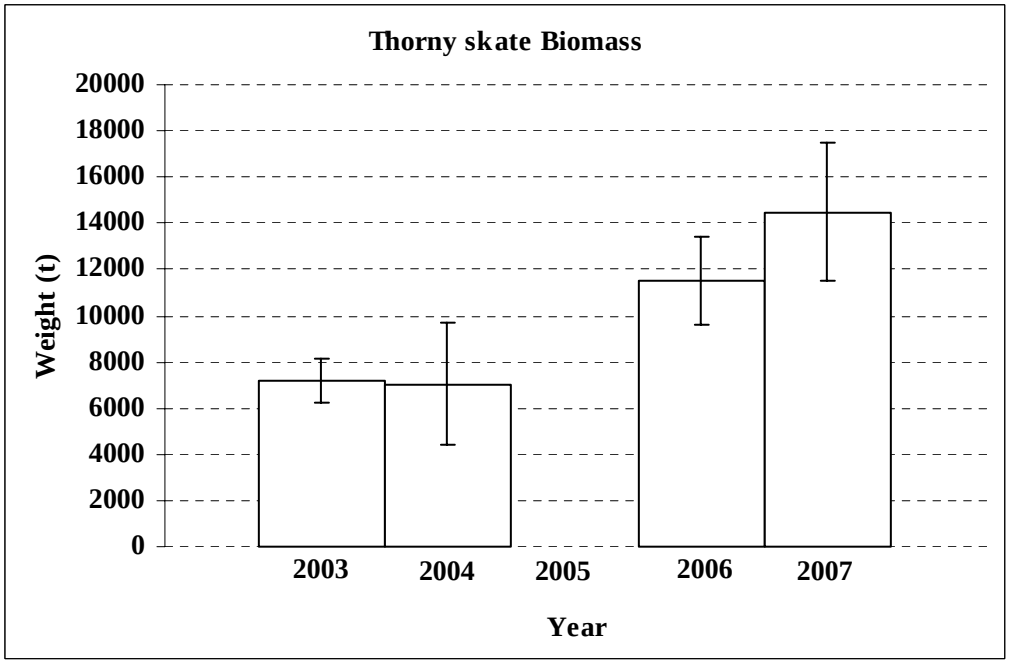

FIGURE 14.- Thorny skate biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

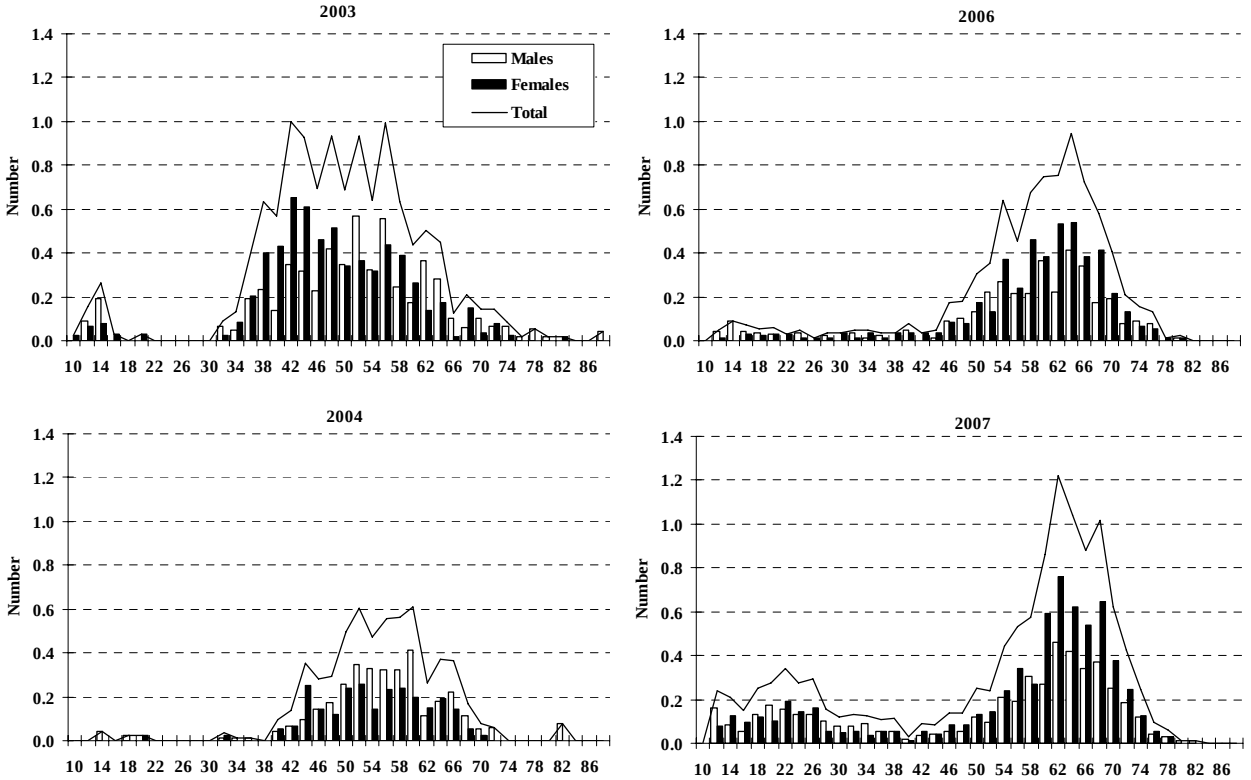

FIGURE 15.- Thorny skate length distribution (cm) in NAFO 3L: 2003-2007. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

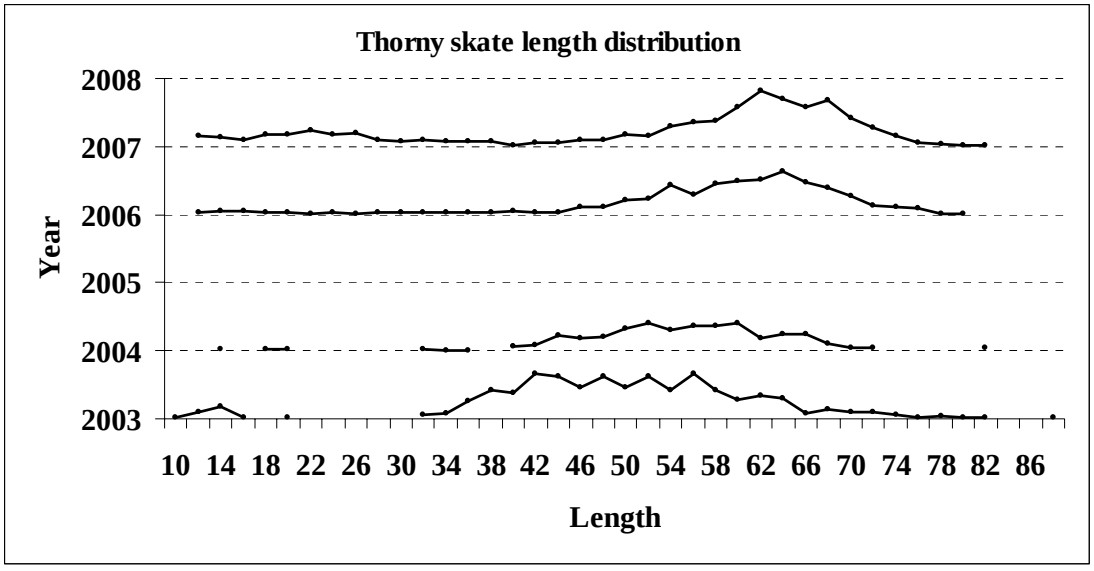

FIGURE 16.- Thorny skate length distribution (cm) in NAFO 3L: 2003-2007.

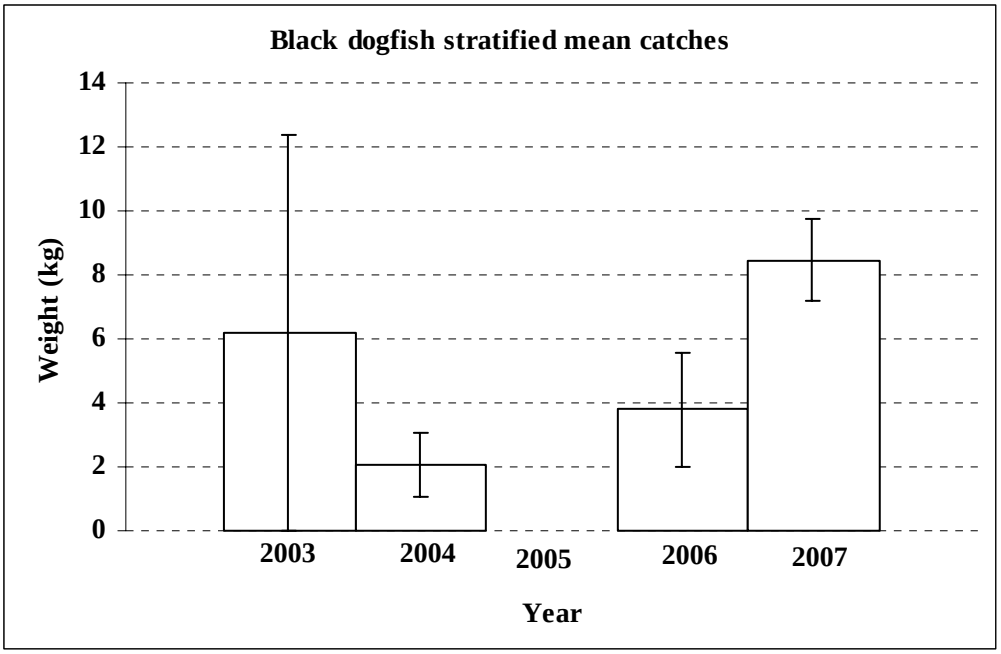

FIGURE 17.- Black dogfish stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

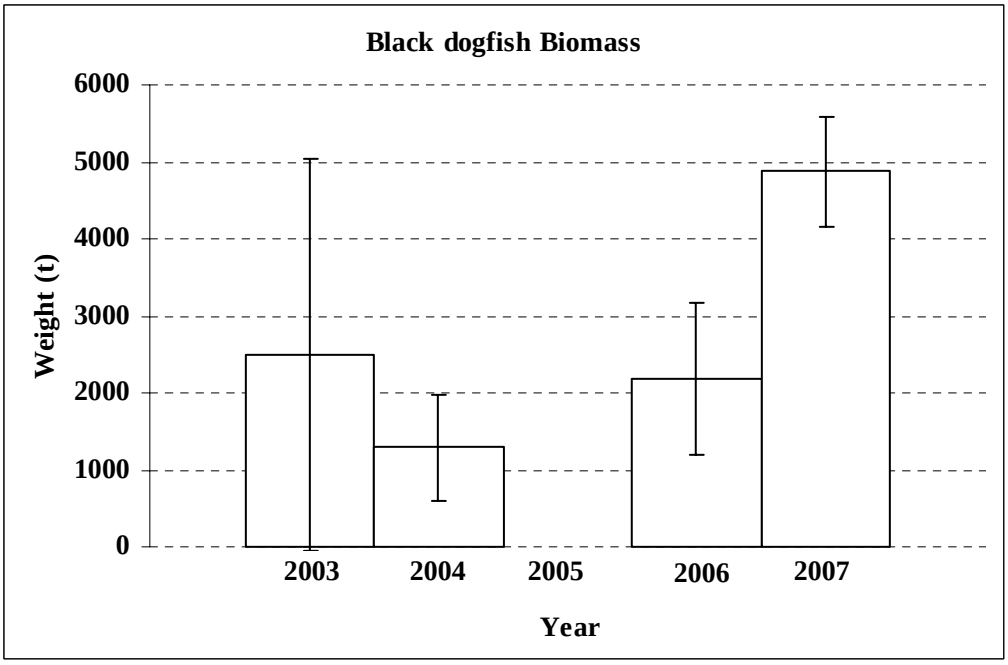

FIGURE 18.- Black dogfish biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2007 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

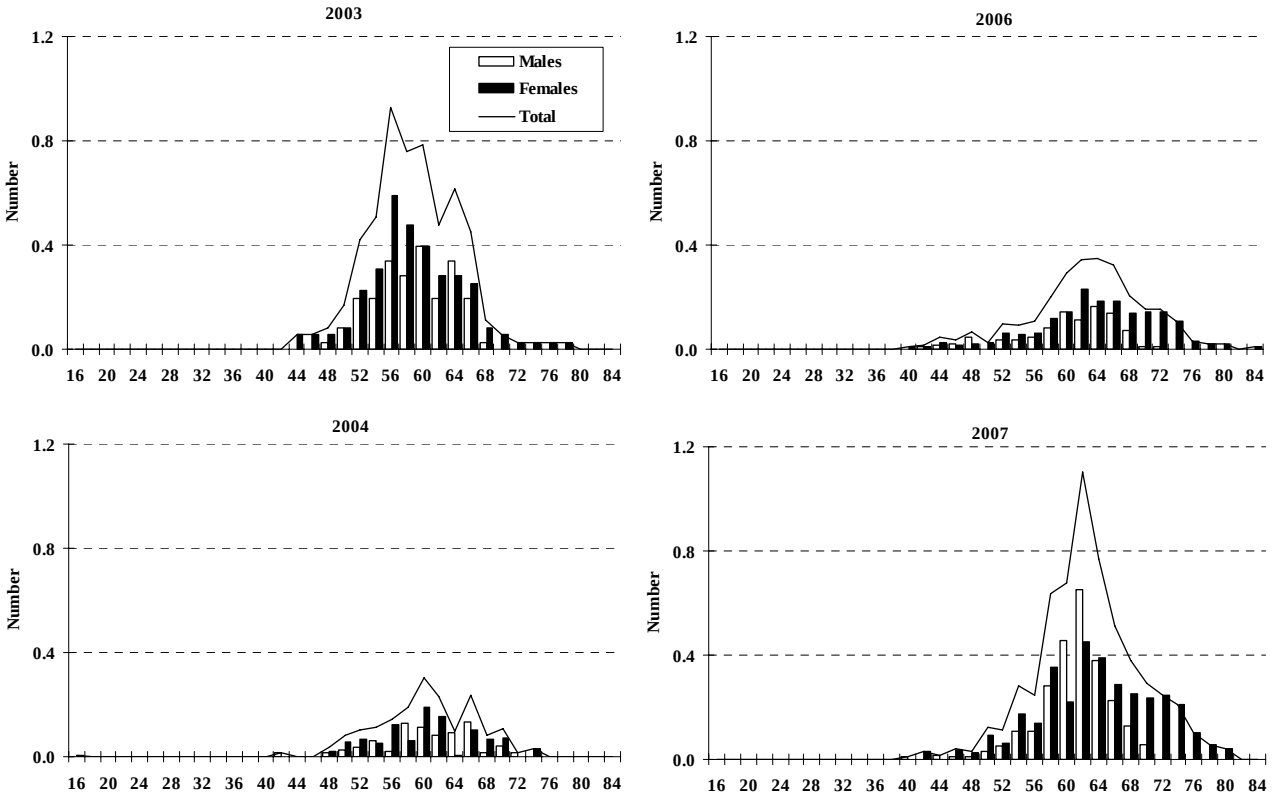

FIGURE 19.- Black dogfish length distribution (cm) in NAFO 3L: 2003-2007. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2007.

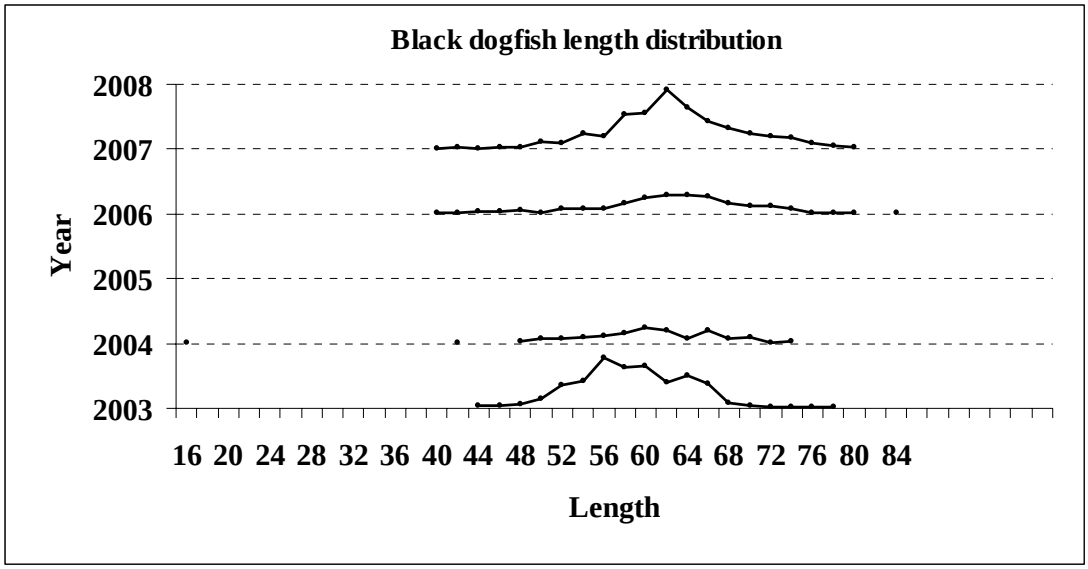

FIGURE 20.- Black dogfish length distribution (cm) in NAFO 3L: 2003-2007.